SUPER®

SUPER P4QH8
SUPER P4QH6

USER'S MANUAL

Revision 1.0a

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Preface

About This Manual

This manual is written for system integrators, PC technicians and knowledgeable PC users. It provides information for the installation and use of the SUPER P4QH8/P4QH6 mainboard. The SUPER P4QH8/P4QH6 supports up to four Intel Xeon™ MP processors of up to 1.6+ GHz at a 400 MHz system (front side) bus speed. Please refer to the support section of our web site for a complete listing of supported processors (http://www.supermicro.com/TechSupport.htm).

Manual Organization

Chapter 1 includes a checklist of what should be included in your mainboard box, describes the features, specifications and performance of the SUPER P4QH8/P4QH6 mainboard and provides detailed information about the chipset.

Chapter 2 begins with instructions on handling static-sensitive devices. Read this chapter when you want to install the processor and DIMM memory modules and when mounting the mainboard in the chassis. Also refer to this chapter to connect the floppy and hard disk drives, SCSI drives, the IDE interfaces, the parallel and serial ports and the twisted wires for the power supply, the reset button, the power LED, the speaker and the keyboard.

If you encounter any problems, see **Chapter 3**, which describes troubleshooting procedures for the video, the memory and the setup configuration stored in CMOS. For quick reference, a general FAQ [Frequently Asked Questions] section is provided. Instructions are also included for contacting technical support. In addition, you can visit our web site at www.supermicro.com/techsupport.htm for more detailed information.

Chapter 4 includes an introduction to BIOS and provides detailed information on running the CMOS Setup utility.

Appendix A gives information on BIOS error beep codes.

Appendix B provides POST checkpoint codes.

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Chapter 1
Introduction

1-1 Overview

Checklist

Congratulations on purchasing your motherboard from a leader in the industry. Supermicro boards are designed with the utmost attention to detail to provide you with the highest standards in quality and performance.

Please check that the following items have been included with your motherboard. If anything listed here is damaged or missing, contact your retailer.

One (1) Supermicro Mainboard

Four (4) CPU heatsink fans

Four (4) sets of CPU heatsink retention clips

One (1) MEC (Memory Extension Card)

One (1) MEC Retention Plate with screws (SKT-0124)

One (1) CPU Retention Plate with screws (SKT-0125)

One (1) UDMA/100 ribbon cable for IDE devices

One (1) floppy ribbon cable

One (1) COM port serial ribbon cable

One (1) I/O back panel shield (CSE-PT2)

One (1) Supermicro CD and diskettes containing drivers and utilities

One (1) User's/BIOS Manual

One (1) 68-pin Ultra320/160 SCSI cable

One (1) set of SCSI driver diskettes

One (1) SCSI manual

Contacting Supermicro

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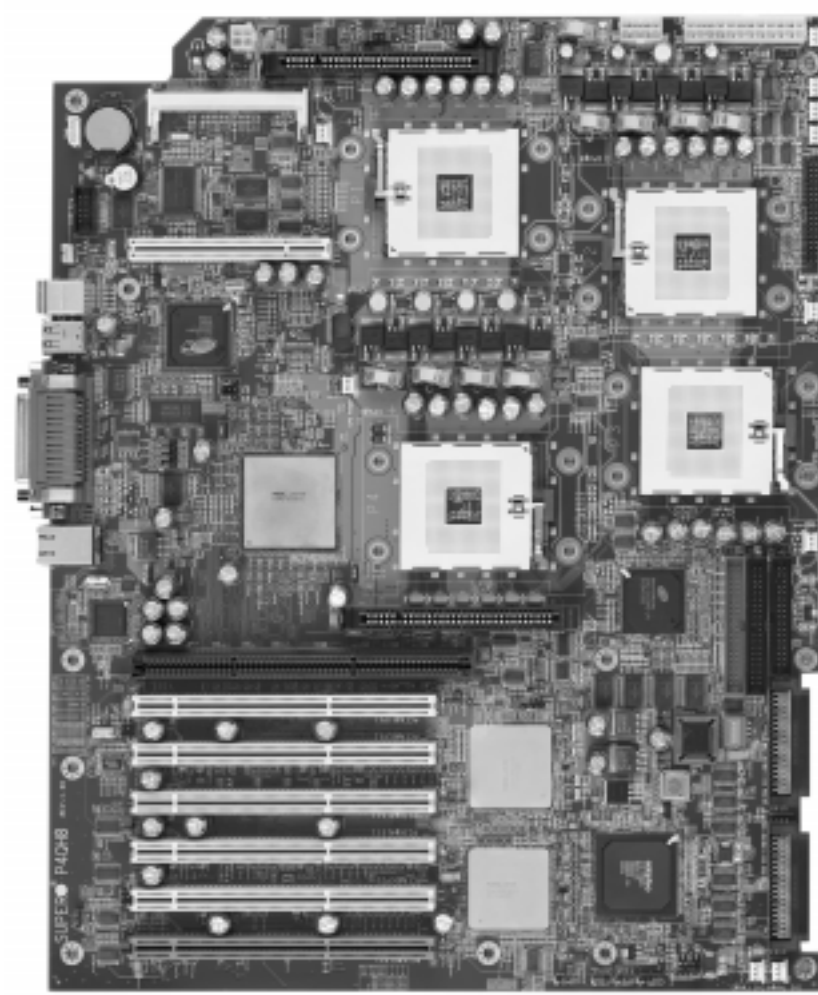
Tel: 886-2-8228-1366, ext.132 or 139

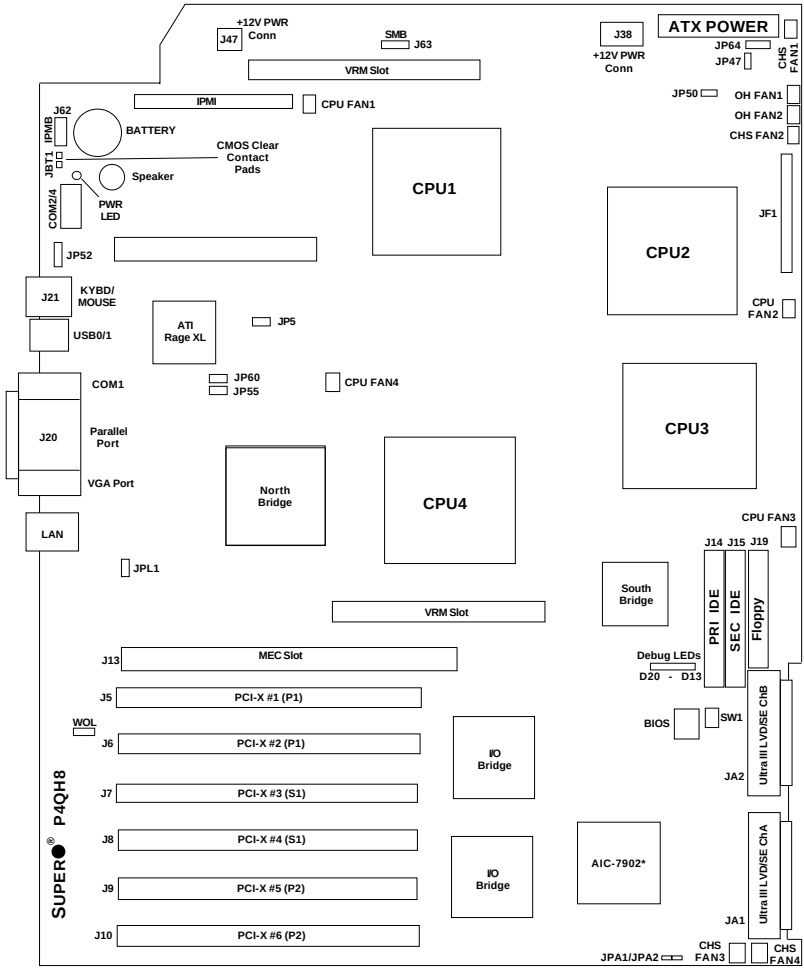
SUPER P4QH8/P4QH6

Figure 1-1. SUPER P4QH8/P4QH6 Image



Note: The only difference between the P4QH8 and the P4QH6 is the type of onboard SCSI controller (Ultra320 and Ultra160, respectively).

Figure 1-2. SUPER P4QH8/P4QH6 Layout
(not drawn to scale)



- Memory modules must be installed in fours (see Section 2-3).
- DIP Switch 1 sets the processor speed (see Section 2-6).
- Refer also to Chapter 2 for the locations of the I/O ports, Front Control Panel (JF1) connectors and details on jumper settings and pin definitions.

- VRM Slots: These are included to support future processors with different voltage requirements (VRM modules not included).
- Jumpers not indicated are for test purposes only.

*The P4QH6 has an AIC-7899 SCSI controller.

P4QH8/P4QH6 Quick Reference

Jumper	Description	Default Setting
JA4	SCSI Enable/Disable	Pins 1-2 (Enabled)
JBT1	CMOS Clear	See Section 2-7
JPA1/JA2	SCSI Ch A/B Term En/Dis	Open (Enabled)
JPL1	LAN Enable/Disable	Pins 1-2 (Enabled)
JP5	Spread Spectrum	Closed (Enabled)
JP47	3rd P/S Fail Alarm En/Dis	Open (Disabled)
JP48	Overheat Fan Force On	Open (Normal)
JP55,60	VGA Enable/Disable	Pins 1-2 (Enabled)

Connector	Description
ATX PWR CONN	Primary ATX Power Connector
COM1/3	COM1/3 Serial Port Connector
COM2/4	COM2/4 Serial Port /Header
CPU/CH/OH FAN	CPU/Overheat/Chassis Fan Headers
D13-D20	Debug LEDs (see Section 2-8)
IPMI	IPMI Slot (optional)
JA1/JA2	Ultra320/160 Channel A/B LVD SCSI
JF1	Front Control Panel Header
JP46	Power Supply Fail Header
JP50	Front Panel NMI Header
JP52	Wake-On-Ring (WOR) Connnector
JP62	IPMB Connector
J14	Primary IDE Hard Disk Drive Connector
J15	Secondary IDE Hard Disk Drive Connector
J19	Floppy Disk Drive Connector
J20	Parallel Printer Port
J21	PS/2 Keyboard/Mouse
J38	+12V 8-pin Power Connector
J47	+12V 4-pin Power Connector
J63	System Management Bus Connector
LAN	Ethernet Port (Mb LAN)
MEC Slot	Memory Expansion Card Slot
USB 0/1	Universal Serial Bus Ports
WOL	Wake-on-LAN Header

Note: The only difference between the P4QH8 and the P4QH6 is the type of the onboard SCSI (Ultra320 and Ultra160, respectively).

Motherboard Features

CPU

- One, two or four Intel Xeon™ MP processors of up to 1.6+ GHz with a 512KB L3 cache at a front side bus speed of 400 MHz.

  Note: Please refer to the support section of our web site for a complete listing of supported processors (http://www.supermicro.com/TechSupport.htm). See Section 2-2 for more details.

Memory

- MEC (Memory Expansion Card) with 16 184-pin DIMM sockets supporting up to 32 GB of registered ECC DDR-200 (PC1600) SDRAM

  Note: Memory modules must be installed four at a time into the MEC (see Section 2-3). DDR-266 (PC2100) is supported but only at 200 MHz.

Chipset

- ServerWorks Grand Champion HE

Expansion Slots

- Six 64-bit, 100 MHz PCI-X slots
- One MEC slot
- One 32-bit PCI slot for debug POST card

BIOS

- 4 Mb AMI® Flash ROM
- APM 1.2, DMI 2.1, PCI 2.2, ACPI 1.0, Plug and Play (PnP), SYMBIOS 2.3

PC Health Monitoring

- Four onboard voltage monitors for CPU core, +3.3V, +5V and +12V
- Four-fan status monitor with firmware/software on/off control
- CPU fan auto-off in sleep mode
- Power-up mode control for recovery from AC power loss
- System overheat LED and control
- System resource alert

Onboard I/O

- AIC-7902 for dual channel Ultra320 SCSI (P4QH8)
- AIC-7899 for dual channel Ultra160 SCSI (P4QH6)
- Integrated ATI Rage XL 8 MB Graphics Controller
- Intel 82550 for integrated onboard Ethernet
- Dual channel ATA/100 EIDE bus master controller
- 1 floppy port interface
- 2 Fast UART 16550A compatible serial ports
- 1 EPP/ECP (Enhanced Parallel Port/Extended Capabilities Port)
- PS/2 mouse and PS/2 keyboard ports
- 2 USB 1.1 (Universal Serial Bus) ports

Other

- Internal/external modem ring-on
- Recovery from AC power loss control
- Wake-on-LAN (WOL)

CD/Diskette Utilities

- BIOS flash upgrade utility
- Device drivers

Dimensions

- SWTX: 16" x 13" (406 x 330 mm)

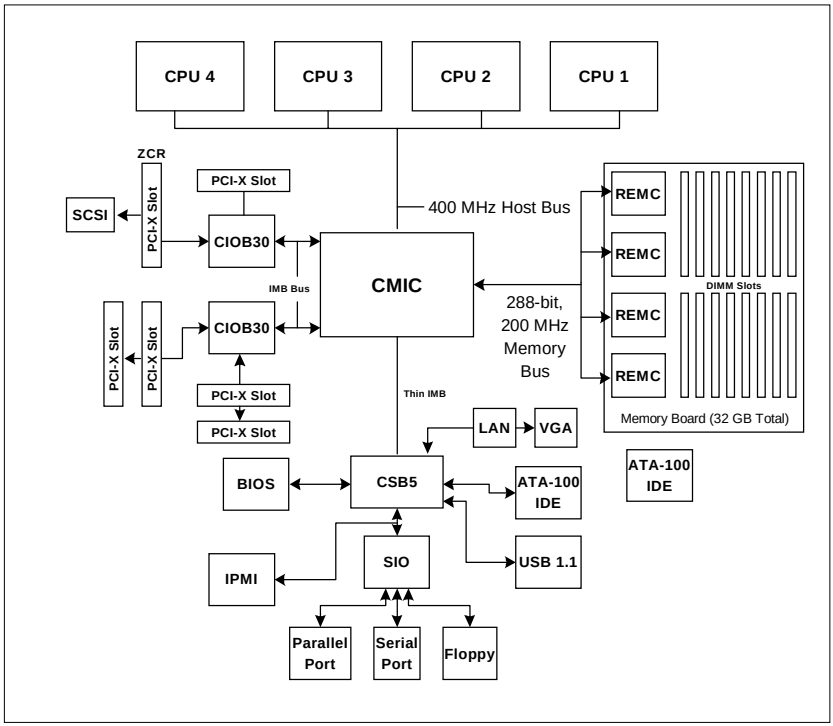


Figure 1-5. ServerWorks GC-HE Chipset: System Block Diagram

Note: This is a general block diagram. Please see the previous Motherboard Features Section for details on the features of your motherboard.

1-2 Chipset Overview

The ServerWorks Grand Champion HE Classic chipset was designed for quad processor systems with very high memory capacity requirements. The chipset is comprised of three major components: CMIC (Champion Memory and I/O Controller), CIOB30 (Champion I/O Bridge) and REMC (Reliability Enhanced Memory Controller).

The CMIC interfaces directly with the front side (system) bus and integrates the functions of the main memory controller for DDR memory. The CIOB30 is the I/O bridge between the IMB interface and the dual peer PCI-X bus interfaces. The REMCs perform address and data path multiplexing between the CMIC and main memory. Each set of four DIMM slots has its own REMC.

1-3 Special Features

ATI Graphics Controller

The P4QH8/P4QH6 has an integrated ATI video controller based on the Rage XL graphics chip. The Rage XL utilizes 8 MB of memory and fully supports sideband addressing. This onboard graphics package can provide a bandwidth of up to 512 MB/sec over a 32-bit graphics memory bus.

BIOS Recovery

The BIOS Recovery function allows you to recover your BIOS image file if the BIOS flashing procedure fails (see Section 3-3).

Recovery from AC Power Loss

BIOS provides a setting for you to determine how the system will respond when AC power is lost and then restored to the system. You can choose for the system to remain powered off (in which case you must hit the power switch to turn it back on) or for it to automatically return to a power on state. See the Power Lost Control setting in the Advanced BIOS Setup section (Peripheral Device Configuration) to change this setting. The default setting is Always On.

1-4 PC Health Monitoring

This section describes the PC health monitoring features of the SUPER P4QH8/P4QH6. These motherboards have an onboard System Hardware Monitor chip that supports PC health monitoring.

Onboard Voltage Monitors for the CPU Cores, +5V and +12V

The onboard voltage monitor will scan these voltages continuously. Once a voltage becomes unstable, a warning is given or an error message is sent to the screen. Users can adjust the voltage thresholds to define the sensitivity of the voltage monitor.

Fan Status Monitor with Firmware/Software On/Off Control

The PC health monitor can check the RPM status of the CPU cooling fans. The onboard 3-pin CPU fans are controlled by the power management functions. The thermal fan is controlled by the overheat detection logic.

Environmental Temperature Control

The thermal control sensor monitors the CPU temperature in real time and will turn on the thermal control fan whenever the CPU temperature exceeds a user-defined threshold. The overheat circuitry runs independently from the CPU. It can continue to monitor for overheat conditions even when the CPU is in sleep mode. Once it detects that the CPU temperature is too high, it will automatically turn on the thermal control fan to prevent any overheat damage to the CPU.

CPU Fan Auto-Off in Sleep Mode

The CPU fan activates when the power is turned on. It can be turned off when the CPU is in sleep mode. When in sleep mode, the CPU will not run at full power, thereby generating less heat.

System Resource Alert

This feature is available when used with Intel's LANDesk Client Manager (optional). It is used to notify the user of certain system events. For example, if the system is running low on virtual memory and there is insufficient hard drive space for saving the data, you can be alerted of the potential problem.

Hardware BIOS Virus Protection

The system BIOS is protected by hardware that prevents viruses from infecting the BIOS area. The user can only change the BIOS content through the flash utility provided by Supermicro. This feature can prevent viruses from infecting the BIOS area and destroying valuable data.

Auto-Switching Voltage Regulator for the CPU Core

The auto-switching voltage regulator for the CPU core can support up to 20A current and auto-sense voltage IDs ranging from 1.4V to 3.5V. This will allow the regulator to run cooler and thus make the system more stable.

1-5 ACPI Features

ACPI stands for Advanced Configuration and Power Interface. The ACPI specification defines a flexible and abstract hardware interface that provides a standard way to integrate power management features throughout a PC system, including its hardware, operating system and application software. This enables the system to automatically turn on and off peripherals such as CD-ROMs, network cards, hard disk drives and printers. This also includes consumer devices connected to the PC such as VCRs, TVs, telephones and stereos.

In addition to enabling operating system-directed power management, ACPI provides a generic system event mechanism for Plug and Play and an operating system-independent interface for configuration control. ACPI leverages the Plug and Play BIOS data structures while providing a processor architecture-independent implementation that is compatible with Windows2000.

Microsoft OnNow

The OnNow design initiative is a comprehensive, system-wide approach to system and device power control. OnNow is a term for a PC that is always on but appears to be off and responds immediately to user or other requests.

Slow Blinking LED for Suspend-State Indicator

When the CPU goes into a suspend state, the chassis power LED will start blinking to indicate that the CPU is in suspend mode. When the user presses any key, the CPU will wake-up and the LED will automatically stop blinking and remain on.

Main Switch Override Mechanism

When an ATX power supply is used, the power button can function as a system suspend button to make the system enter a SoftOff state. The monitor will be suspended and the hard drive will spin down. Depressing the power button again will cause the whole system to wake-up. During the SoftOff state, the ATX power supply provides power to keep the required circuitry in the system alive. In case the system malfunctions and you want to turn off the power, just depress and hold the power button for 4 seconds. This option can be set in the Power section of the BIOS Setup routine.

External Modem Ring-On

Wake-up events can be triggered by a device such as the external modem ringing when the system is in the SoftOff state. Note that external modem ring-on can only be used with an ATX 2.01 (or above) compliant power supply.

Wake-On-LAN (WOL)

Wake-On-LAN is defined as the ability of a management application to remotely power up a computer that is powered off. Remote PC setup, updates and asset tracking can occur after hours and on weekends so that daily LAN traffic is kept to a minimum and users are not interrupted. The motherboards have a 3-pin header (WOL) to connect to the 3-pin header on a Network Interface Card (NIC) that has WOL capability. Wake-On-LAN must be enabled in BIOS. Note that Wake-On-Lan can only be used with an ATX 2.01 (or above) compliant power supply.

1-6 Power Supply

As with all computer products, a stable power source is necessary for proper and reliable operation. It is even more important for processors that have CPU clock rates of 1 GHz and above.

The SUPER P4QH8/P4QH6 accommodates ATX power supplies. Although most power supplies generally meet the specifications required by the CPU, some are inadequate. Your power supply must have 24-pin, 8-pin and 4-pin power connectors and should supply at least 600W of power - an even higher wattage power supply is recommended for high-load configurations. Also your power supply must provide a +5V standby voltage that supplies at least 720 mA of current. In addition, 1.5A is needed for the LAN port.

It is strongly recommended that you use a high quality power supply that meets ATX power supply Specification 2.02 or above. Additionally, in areas where noisy power transmission is present, you may choose to install a line filter to shield the computer from noise. It is recommended that you also install a power surge protector to help avoid problems caused by power surges. For the P4QH8/P4QH6, we recommend the Supermicro SC862 4U chassis (CSE-0035) and the SC850 P4 power supply (PWS-0039), which provides 700 watts of continuous power.

1-7 Super I/O

The disk drive adapter functions of the Super I/O chip include a floppy disk drive controller that is compatible with industry standard 82077/765, a data separator, write pre-compensation circuitry, decode logic, data rate selection, a clock generator, drive interface control logic and interrupt and DMA logic. The wide range of functions integrated onto the Super I/O greatly reduces the number of components required for interfacing with floppy disk drives. The Super I/O supports 360 K, 720 K, 1.2 M, 1.44 M or 2.88 M disk drives and data transfer rates of 250 Kb/s, 500 Kb/s or 1 Mb/s. It also provides two high-speed, 16550 compatible serial communication ports (UARTs), one of which supports serial infrared communication. Each UART includes a 16-byte send/receive FIFO, a programmable baud rate generator, complete modem control capability and a processor interrupt system.
Each UART includes a 16-byte send/receive FIFO, a programmable baud rate generator, complete modem control capability and a processor interrupt system. Both UARTs provide legacy speed with baud rate of up to 115.2 Kbps as well as an advanced speed with baud rates of 250 K, 500 K, or 1 Mb/s, which support higher speed modems.

The Super I/O supports one PC-compatible printer port (SPP), Bi-directional Printer Port (BPP) , Enhanced Parallel Port (EPP) or Extended Capabilities Port (ECP).

The Super I/O provides functions that comply with ACPI (Advanced Configuration and Power Interface), which includes support of legacy and ACPI power management through an SMI or SCI function pin. It also features auto power management to reduce power consumption.

The IRQs, DMAs and I/O space resources of the Super I/O can flexibly adjust to meet ISA PnP requirements, which suppport ACPI and APM (Advanced Power Management).

Chapter 2
Installation

2-1 Static-Sensitive Devices

Electric-Static-Discharge (ESD) can damage electronic components. The precautions listed below are generally sufficient to protect your equipment from ESD. Also, to prevent damage to your system board, it is important to handle it very carefully. Also note that the size and weight of the P4QH8/P4QH6 motherboard system board can cause it to bend if handled improperly, which may result in damage. To prevent the P4QH8/P4QH6 from bending, always keep one hand under the center of the board to support it when handling.

Precautions

- Use a grounded wrist strap designed to prevent static discharge.
- Touch a grounded metal object before removing the board from the antistatic bag.
- Handle the board by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.
- When handling chips or modules, avoid touching their pins.
- Put the motherboard and peripherals back into their antistatic bags when not in use.
- For grounding purposes, make sure your computer chassis provides excellent conductivity between the power supply, the case, the mounting fasteners and the motherboard.

Unpacking

The motherboard is shipped in antistatic packaging to avoid static damage. When unpacking the board, make sure the person handling it is static protected.

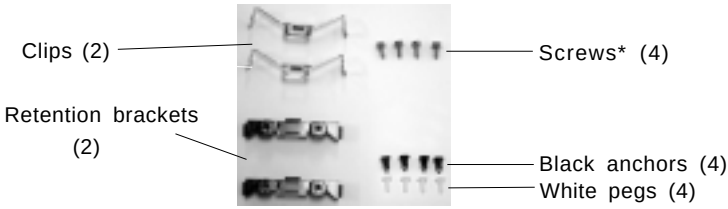
2-2 PGA Processor and Heatsink Installation

When handling the processor package, avoid placing direct pressure on the label area of the fan. Also, do not place the motherboard on a conductive surface, which can damage the BIOS battery and prevent the system from booting up.

Processor Support:
Single or Dual: Intel Xeon MP processors to 1.6 GHz. Install processors into the CPU1 (single) socket or CPU1 and and CPU4 sockets (dual).
Quad: Intel Xeon MP processors to 1.6 GHz.

IMPORTANT: Always connect the power cord last and always remove it before adding, removing or changing any hardware components. Make sure that you install the processor into the CPU socket **before** you install the CPU heat sink.

1. Locate the following components, which are included in the shipping package. The amounts shown are for each CPU.



*These screws are for mounting the motherboard to the CPU retention plate, which should be placed between the motherboard and the chassis to secure the CPUs.

2. Insert the white pegs into the black anchors. Do not force the white pegs all the way in - only about 1/3 of the way into the black anchors.

Anchor/peg assemblies

3. Place a retention bracket in the proper position and secure it by pressing pegs into two of the retention holes until you hear a *click*. The clicking sound indicates that the peg is locked and secured in the retention plate.

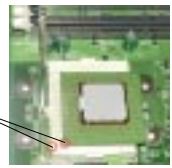
Two pegs in position

One retention bracket in position

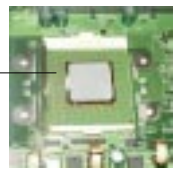
4. Secure the other retention bracket into position by repeating Step 3.

5. Lift the lever on the CPU socket: *lift the lever completely or you will damage the CPU socket when power is applied. (Install CPU1 first.)*

6. Install the CPU in the socket. Make sure that pin 1 of the CPU is seated on pin 1 of the socket (both corners are marked with a triangle). Install a CPU into CPU socket #1 first (you may install 2 or 4 CPUs).



7. Press the lever down until you hear it *click* into the locked position.



8. Apply the proper amount of thermal compound to the CPU die and place the heatsink and fan on top of the CPU.

9. Secure the heatsink by locking the retention clips into their proper position.

10. Connect the three wires of the CPU fan to the respective CPU fan connector. Repeat steps for the other three CPUs. For a dual configuration, install the next CPU into the CPU4 socket.

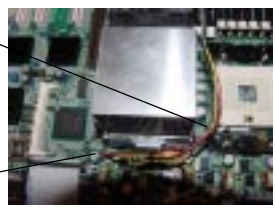
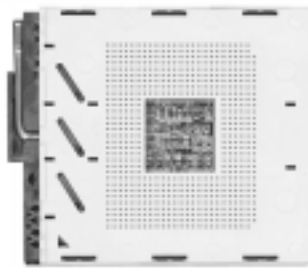


Figure 2-1. 603PGA Socket: Empty and with Processor Installed

Warning! Make sure you lift the lever completely when installing the CPU. If the lever is only partly raised, damage to the socket or CPU may result.



2-3 Installing Memory in the MEC

Note: Check the Supermicro web site for recommended memory modules: http://www.supermicro.com/TECHSUPPORT/FAQs/Memory_vendors.htm

CAUTION

Exercise extreme care when installing or removing DIMM modules to prevent any possible damage. The MEC must be populated in the manner described in Step 2 below.

Memory Support: The P4QH8/P4QH6 supports 128MB/256MB/512MB/ 1GB and 2GB registered ECC DDR-266/200 SDRAM DIMM memory modules*. Non-ECC or unbuffered SDRAM memory is not supported.

1. Removing the MEC (Memory Expansion Card):

You should remove the MEC whenever installing or removing DIMMs. The MEC is attached to a retention plate with four screws. Do not remove these. Instead, remove only the two screws that secure the MEC retention plate to the chassis. After removing the board, place it on an antistatic bag before inserting the DIMMs.

2. Populating the MEC:

Important: Because memory is accessed by a four-way interleaving scheme, you must install modules four at a time and in the order shown in Figure 2-2 and described here: Always install DIMMs from the bottom of the MEC card up and in groups of four. If four DIMMs are to be installed, you must populate the four DIMM slots along the bottom of the MEC (see Figure 2-2). If eight are to be installed, you must populate the eight bottom DIMM slots, and so on. It is recommended that **all** installed DIMMs be the same brand, type, size and speed.

3. Inserting DIMMs:

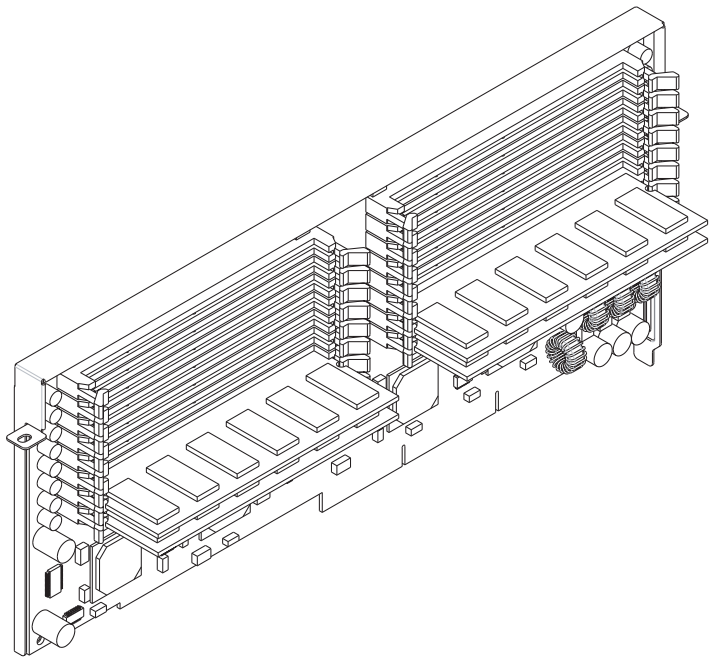
Insert each DIMM module vertically into its slot. Pay attention to the notch along the bottom of the module to prevent inserting it incorrectly. Gently press down on the DIMM module until it snaps into place in the slot (see Figure 2-3). If you use too much pressure when inserting the DIMMs you may bend and damage the MEC.

***Note: TheP4QH8/P4QH6 has been designed to support 2GB DIMM modules in each memory slot, but it has only been validated for 1GB memory modules.**

4. Installing the MEC:

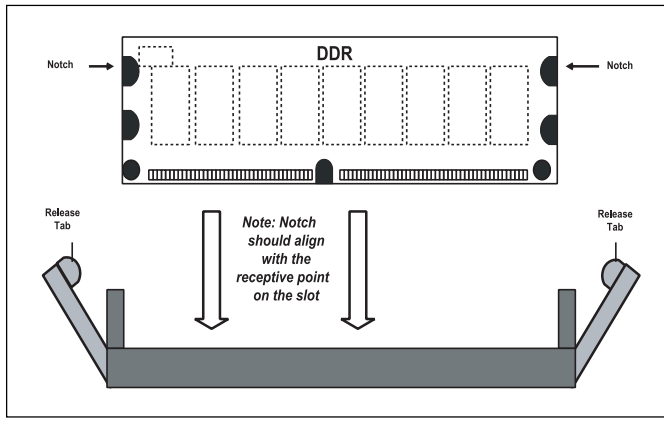
After populating the MEC, carefully install it back into its slot on the motherboard, making sure it is fully seated. Finish by tightening the two screws that secure the retention plate to the chassis.

Figure 2-2. Populating the MEC
(Four DIMM installation shown)

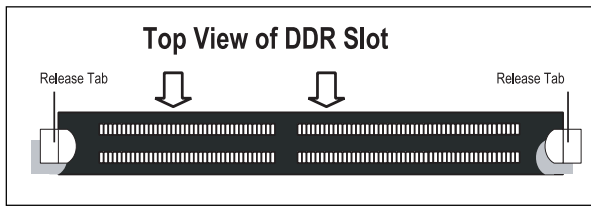


Note: Always install DIMMs from the bottom of the MEC card up and in groups of four. If four DIMMs are to be installed, you must populate the four DIMM slots along the bottom of the MEC (as shown in Figure 2-2). If eight are to be installed, you must populate the eight bottom DIMM slots, and so on.

Figure 2-3. Installing DIMM into Slot



To Install: Insert module vertically and press down until it snaps into place. Pay attention to the notch.



To Remove:
Use your thumbs to gently push near the edge of both ends of the module. This should release it from the slot.

2-4 I/OPorts/Control Panel Connectors

The I/O ports are color coded in conformance with the PC 99 specification. See Figure 2-4 below for the colors and locations of the various I/O ports.

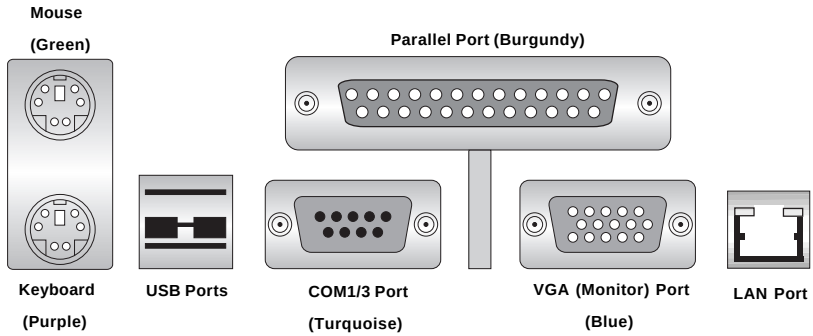


Figure 2-4. I/O Port Locations and Definitions

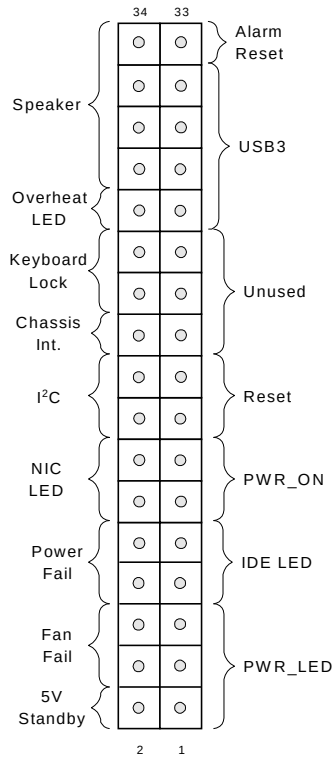
Note: COM2/4 is a header located near the battery on the motherboard.

Front Control Panel

JF1 contains header pins for various front control panel connectors. JF1 was designed for a bundled wire connection for use with Supermicro server chassis. See Figure 2-5 for the pin locations of the various front control panel buttons and LED indicators. Refer to the following section for descriptions and pin definitions.

Note: JF1 conforms to the 34-pin SSI standard to be used with Supermicro chassis, which is why some connections (such as Overheat LED) have only a single pin.

Figure 2-5. JF1 Header Pins



JF1

2-5 Connecting Cables

Main ATX Power Supply Connection

24-pin connector:
The power supply connector on the P4QH8/P4QH6 meets the SSI (Superset ATX) 24-pin specification. See the table on the right for pin definitions.
Note: the use of a 20-pin power connector is not recommended.

24-pin Power Connector
Pin Definitions (ATX Power Conn)

Pin Number	Definition	Pin Number	Definition
13	+3.3V	1	+3.3V
14	-12V	2	+3.3V
15	COM	3	COM
16	PS_ON#	4	+5V
17	COM	5	COM
18	COM	6	+5V
19	COM	7	COM
20	Res(NC)	8	PWR_OK
21	+5V	9	5VSB
22	+5V	10	+12V
23	+5V	11	+12V
24	COM	12	+3.3V

Secondary Power Connections

In addition to the Primary ATX power connector (above), the two secondary power connections (at J38 and J47) must also be connected to your power supply. See the tables on the right for pin definitions.

8-Pin +12v Power Supply Connector (J38)

Required connection

Pins	Definition
1 thru 4	Ground
5 thru 8	+12v

4-Pin +12v Power Supply Connector (J47)

Required connection

Pins	Definition
1 & 2	Ground
3 & 4	+12v

Power LED

The Power LED connection is located on pins 1, 3 and 5 of JF1. Refer to the table on the right for pin definitions.

PWR_LED Pin Definitions (JF1)

Pin Number	Definition
1	+5V
3	Key
5	GND

IDE/HDD LED

The IDE/HDD (Hard Drive) LED connection is located on pins 7 and 9 of JF1. Attach the IDE hard drive LED cable to the correct pins to display disk activity. Refer to the table on the right for pin definitions.

IDE_LED Pin Definitions (JF1)

Pin Number	Definition
7	+5V
9	HD Active

PWR_ON

The PWR_ON connection is located on pins 11 and 13 of JF1. Momentarily contacting both pins will power on/off the system. This button can also be configured to function as a suspend button (see the Power Button Mode setting in BIOS). To turn off the power when set to suspend mode, depress the button for at least 4 seconds. Refer to the table on the right for pin definitions.

PWR_ON Connector Pin Definitions (JF1)

Pin Number	Definition
11	PW_ON
13	Ground

Reset

The Reset connection is located on pins 15 and 17 of JF1. Attach it to the hardware reset switch on the computer case. Refer to the table on the right for pin definitions.

Reset Pin Definitions (JF1)

Pin Number	Definition
15	Reset
17	Ground

NIC_LED

The Network Interface Controller LED connection is located on pins 12 and 14 of JF1. Attach an NIC LED cable to display network activity. Refer to the table on the right for pin definitions.

NIC_LED Pin Definitions (JF1)

Pin Number	Definition
12	+5V
14	GND

I²C

The I²C connection is located on pins 16 and 18 of JF1. Refer to the table on the right for pin definitions.

I²C Pin Definitions (JF1)

Pin Number	Definition
16	SDA
18	SCL

Chassis Intrusion

A Chassis Intrusion connection is located on pin 20 of JF1. See the table on the right for pin definitions.

Chassis Intrusion Pin Definitions (JF1)

Pin Number	Definition
20	Intrusion Input

Keyboard Lock

The Keyboard Lock connection is located on pins 22 and 24 of JF1. See the table on the right for pin definitions.

Keyboard Lock Pin Definitions (JF1)

Pin Number	Definition
22	+5V
24	GND

Overheat LED (OH)

Connect an LED to pin 26 of JF1 to provide advanced warning of chassis overheating. Refer to the table on the right for pin definitions.

Overheat LED Pin Definitions (JF1)

Pin Number	Definition
26	Signal

Speaker

The speaker connection is located on pins 28, 30, 32 and 34 of JF1. See the table on the right for pin definitions.

Note: if you don't use a bundled wire connector on JF1, you must short pins 32 and 34 with a jumper to enable the speaker.

Speaker Connector Pin Definitions (JF1)

Pin Number	Function	Definition
28	+	Red wire, Speaker data
30	Key	No connection
32		Key
34		Speaker data

Fan Headers*

The motherboard has four CPU fans, four chassis fans and two overheat fan headers. See the table on the right for pin definitions.

Fan Header Pin Definitions (CPU/CHS/OH Fans)

Pin Number	Definition
1	Ground (black)
2	+12V (red)
3	Tachometer

Caution: These fan headers are DC power.

Serial Ports

COM1/COM3 is located under the parallel port (see Figure 2-4). See the table on the right for pin definitions. The COM2/COM4 header is located near the battery on the motherboard.

Serial Port Pin Definitions (COM1/COM3)

Pin Number	Definition	Pin Number	Definition
1	DCD	6	CTS
2	DSR	7	DTR
3	Serial In	8	RI
4	RTS	9	Ground
5	Serial Out	10	NC

ATX PS/2 Keyboard and PS/2 Mouse Ports

The ATX PS/2 keyboard and the PS/2 mouse are located on J21. See the table on the right for pin definitions. (The mouse port is above the keyboard port. See Figure 2-4.)

PS/2 Keyboard and Mouse Port Pin Definitions (J18)

Pin Number	Definition
1	Data
2	NC
3	Ground
4	VCC
5	Clock
6	NC

Universal Serial Bus (USB)

Two Universal Serial Bus ports are located beside the keyboard/ mouse ports. USB0 is the bottom connector and USB1 is the top connector. See the table on the right for pin definitions.

Universal Serial Bus Pin Definitions

USB0		USB1	
Pin Number	Definition	Pin Number	Definition
1	+5V	1	+5V
2	P0-	2	P0-
3	P0+	3	P0+
4	Ground	4	Ground
5	N/A	5	Key

IPMB

An IPMB (Intelligent Platform Management Bus) connection is located at J62. Connect the appropriate cable here to utilize IPMI.

SMB

An SMB (System Management Bus) connection is located at J63. Connect the appropriate cable here to utilize SMB on your system.

Wake-On-LAN

The Wake-On-LAN header is designated as WOL. You must enable the LAN Wake-Up setting in BIOS to use this feature and have a LAN card with a Wake-on-LAN connector and cable. See table on the right for pin definitions.

Wake-On-LAN Pin Definitions (WOL)

Pin Number	Definition
1	+5V Standby
2	Ground
3	Wake-up

Wake-On-Ring

The Wake-On-Ring header is designated as JP52. This function allows your system to receive and be "woken up" by an incoming call to the LAN port when in suspend state. See the table on the right for pin definitions. You must have a Wake-on-Ring card and cable to use this feature.

Wake-On-LAN Pin Definitions (JP52)

Pin Number	Definition
1	+5V Standby
2	Ground
3	Wake-up

Power Supply Fail Header

Connect a cable from your power supply to the header labelled JP46 to provide warning of power supply failure. This warning signal is passed through the PWR_LED pin on JF1 to provide indication of a power failure on the chassis. This feature is only available when using triple-redundant Supermicro power supplies. See the table on the right for pin definitions.

Power Supply Fail Header Pin Definitions (JP46)

Pin Number	Definition
1	P/S 1 Fail Signal
2	P/S 2 Fail Signal
3	P/S 3 Fail Signal
4	Reset (from MB)

Front Panel NMI Header

Connect a cable from the NMI button on your chassis to the header labelled JP50 for front side NMI control. NMI allows you to issue a non-maskable interrupt to force the system to a halt state. This is used for diagnostic purposes and allows you to perform a memory download to determine the cause of a problem.

2-6 DIP Switch Settings

DIP Switch 1: Processor Speed

The red "DIP" switch labeled SW1 has four individual switches, which are used to set the processor speed.

Refer to the table on the right for the correct settings for the various speeds of supported processors.

Note: Most Intel processors have a fixed processor speed that overwrites the setting of DIP Switch 1.

Processor Speed Selection (DIP Switch1)

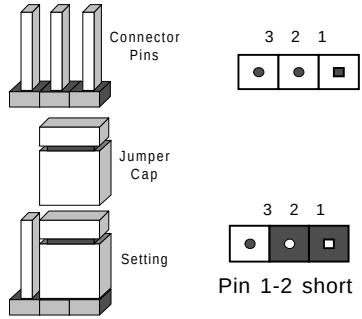
CPU Speed	SW #1	SW #2	SW #3	SW #4
1.6 GHz	OFF	OFF	OFF	ON
1.7 GHz	ON	OFF	OFF	ON
1.8 GHz	OFF	ON	OFF	ON
1.9 GHz	ON	ON	OFF	ON
2.0 GHz	OFF	OFF	ON	ON
2.1 GHz	ON	OFF	ON	ON
2.2 GHz	OFF	ON	ON	ON
2.3 GHz	ON	OFF	OFF	OFF
2.4 GHz	ON	ON	ON	ON

2-7 Jumper Settings

Explanation of Jumpers

To modify the operation of the motherboard, jumpers can be used to choose between optional settings. Jumpers create shorts between two pins to change the function of the connector. Pin 1 is identified with a square solder pad on the printed circuit board. See the motherboard layout pages for jumper locations.

Note: On two pin jumpers, "Closed" means the jumper is on and "Open" means the jumper is off the pins.



CMOS Clear

JBT1 is used to clear CMOS. Instead of pins, this jumper consists of contact pads to prevent accidentally clearing the contents of CMOS. To clear CMOS, use a metal object such as a small screwdriver to touch both pads at the same time to short the connection. Always remove the AC power cord from the system before clearing CMOS.

Note: For an ATX power supply, you must completely shut down the system, remove the AC power cord and then short JBT1 to clear CMOS. *Do not use the PW_ON connector to clear CMOS*.

SCSI Termination Enable/ Disable

The SCSI Termination jumpers allow you to enable or disable termination for the two SCSI channels. The normal (default) position is open to enable SCSI termination. See the table on the right for jumper settings.

SCSI Termination Enable/Disable Jumper Settings (JPA1, JPA2)

Jumper Position	Definition
Open	Enabled
Closed	Disabled

LAN Enable/Disable

Change the setting of jumper JPL1 to enable or disable the onboard LAN (Ethernet port) on the motherboard. See the table on the right for jumper settings. The default setting is Enabled.

LAN (Ethernet) Enable/Disable Jumper Settings (JPL1)

Jumper Position	Definition
Pins 1-2	Enabled
Pins 2-3	Disabled

Spread Spectrum Enable/ Disable

Jumper JP5 is used to enable or disable the Spread Spectrum feature. Spread Spectrum is a technique used to stabilize operation when a system is being affected by electromagnetic interference. The normal (default) position is closed to enable Spread Spectrum. See the table on the right for jumper settings.

Spread Spectrum Jumper Settings (JP5)

Jumper Position	Definition
Open	Disabled
Closed	Enabled

Third Power Supply Fail Alarm Enable/Disable

This feature is for Supermicro triple redundant power supplies only. When enabled, the system will notify you in the event of a power supply failure. This feature assumes that three power supply units are installed in the chassis, with one acting as a backup. If you only have one or two power supply units installed, you should disable this with JP47 to prevent false alarms. See the table on the right for jumper settings.

3rd Power Supply Fail Alarm Enable/Disable Jumper Settings (JP47)

Jumper Position	Definition
Open	Disabled
Closed	Enabled

LVD Channel A SCSI Termination Enable/Disable

Jumper JPA1 allows you to enable or disable termination for the LVD Channel A SCSI connector. The normal (default) position is open to enable SCSI termination. See the table on the right for jumper settings.

LVD CH A SCSI Termination Jumper Settings (JPA1)

Jumper Position	Definition
Open	Enabled
Closed	Disabled

LVD Channel B SCSI Termination Enable/Disable

Jumper JPA2 allows you to enable or disable termination for the LVD Channel B SCSI connector. The normal (default) position is open to enable SCSI termination. See the table on the right for jumper settings.

LVD CH B SCSI Termination Jumper Settings (JPA2)

Jumper Position	Definition
Open	Enabled
Closed	Disabled

Overheat Fan Force On

JP48 is used to control the function of Overheat Fans #1 and #2. The normal (default) position is open, which means these two fans will activate only in the event of an overheat condition. Closing the jumper forces both fans on to provide continuous operation. See the table on the right for jumper settings.

Overheat Fan Force On Jumper Settings (JP48)

Jumper Position	Definition
Open	Disabled
Closed	Enabled

VGA Enable/Disable

JP55 and JP60 allow you to enable or disable the VGA port. The default position is pins 1 and 2 on both jumpers to enable VGA. See the table on the right for jumper settings.
Note: both jumpers must be either enabled or disabled.

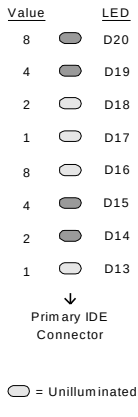
VGA Enable/Disable Jumper Settings (JP55, JP60)

Jumper Position	Definition
1-2	Enabled
2-3	Disabled

2-8 Debug LEDs

D13-D20

Eight surface-mounted debug LEDs located near the primary IDE connector (D13-D20) are used to provide POST code information. See the diagrams below for reading the debug LEDs and refer to Appendix B for a complete list of POST codes (a partial listing of the most common codes are given below). The LED closest to the IDE connector (D13) is the low digit.



Reading the Debug LEDs:
When on, each of the eight separate LEDs represent the value shown to the left of it in the diagram. Add up the values of the illuminated LEDs in D13 to D16 to get the low (right) digit and those in D17 to D20 to get the high (left) digit of the corresponding hexidecimal POST code.

Example:
The example on the left indicates a hexidecimal POST code of C6. This is determined in the following manner:
D17-D20 (high digit): 8 + 4 = 12
(decimal 12 = hexidecimal C)
D13-D16 (low digit): 4 + 2 = 6

Decimal	Hexidecimal Equivalent
0-9	0-9
10	A
11	B
12	C
13	D
14	E
15	F

Common POST Codes:
The following is a list of the most common POST codes that you may see.

POST Code	Meaning
01	Displayed while in BIOS Setup
31	No video card
40	Displayedwhile counting memory
83	Displayed when memory count is finished
85	CMOS Clear
95	Displayedwhile detecting IDE devices
DE	No memory
DE	Wrong type of memory installed
DE	One memory module (two minimum required)

2-9 Parallel Port, Floppy/Hard Disk Drive and SCSI Connections

Note the following when connecting the floppy and hard disk drive cables:

- The floppy disk drive cable has seven twisted wires.
- A red mark on a wire typically designates the location of pin 1.
- A single floppy disk drive ribbon cable has 34 wires and two connectors to provide for two floppy disk drives. The connector with twisted wires always connects to drive A, and the connector that does not have twisted wires always connects to drive B.

Parallel Port Connector

The parallel port is located on J20. See the table on the right for pin definitions.

Parallel (Printer) Port Pin Definitions (J20)

Pin Number	Function	Pin Number	Function
1	Strobe-	2	Auto Feed-
3	Data Bit 0	4	Error-
5	Data Bit 1	6	Init-
7	Data Bit 2	8	SLCT IN-
9	Data Bit 3	10	GND
11	Data Bit 4	12	GND
13	Data Bit 5	14	GND
15	Data Bit 6	16	GND
17	Data Bit 7	18	GND
19	ACK	20	GND
21	BUSY	22	GND
23	PE	24	GND
25	SLCT	26	NC

Floppy Connector

The floppy connector is located on J19. See the table on the right for pin definitions.

Floppy Connector Pin Definitions (JP19)

Pin Number	Function	Pin Number	Function
1	GND	2	FDHDIN
3	GND	4	Reserved
5	Key	6	FDEDIN
7	GND	8	Index-
9	GND	10	Motor Enable
11	GND	12	Drive Select B-
13	GND	14	Drive Select A-
15	GND	16	Motor Enable
17	GND	18	DIR-
19	GND	20	STEP-
21	GND	22	Write Data-
23	GND	24	Write Gate-
25	GND	26	Track 00-
27	GND	28	Write Protect-
29	GND	30	Read Data-
31	GND	32	Side 1 Select-
33	GND	34	Diskette

IDE Connectors

There are no jumpers to configure the onboard IDE connectors J14 and J15. See the table on the right for pin definitions.

IDE Connector Pin Definitions (J14, J15)

Pin Number	Function	Pin Number	Function
1	Reset IDE	2	GND
3	Host Data 7	4	Host Data 8
5	Host Data 6	6	Host Data 9
7	Host Data 5	8	Host Data 10
9	Host Data 4	10	Host Data 11
11	Host Data 3	12	Host Data 12
13	Host Data 2	14	Host Data 13
15	Host Data 1	16	Host Data 14
17	Host Data 0	18	Host Data 15
19	GND	20	Key
21	DRQ3	22	GND
23	I/O Write-	24	GND
25	I/O Read-	26	GND
27	IOCHRDY	28	BALE
29	DACK3-	30	GND
31	IRQ14	32	IOCS16-
33	Addr 1	34	GND
35	Addr 0	36	Addr 2
37	Chip Select 0	38	Chip Select 1-
39	Activity	40	GND

Ultra320/160 SCSI Connectors

Refer to the table below for the pin definitions of the Ultra320/160 (P4QH8/P4QH6) SCSI connectors located at JA1 and JA2.

68-pin Ultra320/160 SCSI Connectors (JA1, JA2)

Connector Contact Number	Signal Names	Connector Contact Number	Signal Names
1	+DB(12)	35	-DB(12)
2	+DB(13)	36	-DB(13)
3	+DB(14)	37	-DB(14)
4	+DB(15)	38	-DB(15)
5	+DB(P1)	39	-DB(P1)
6	+DB(0)	40	-DB(0)
7	+DB(1)	41	-DB(1)
8	+DB(2)	42	-DB(2)
9	+DB(3)	43	-DB(3)
10	+DB(4)	44	-DB(4)
11	+DB(5)	45	-DB(5)
12	+DB(6)	46	-DB(6)
13	+DB(7)	47	-DB(7)
14	+DB(P)	48	-DB(P)
15	GROUND	49	GROUND
16	DIFFSENS	50	GROUND
17	TERMPWR	51	TERMPWR
18	TERMPWR	52	TERMPWR
19	RESERVED	53	RESERVED
20	GROUND	54	GROUND
21	+ATN	55	-ATN
22	GROUND	56	GROUND
23	+BSY	57	-BSY
24	+ACK	58	-ACK
25	+RST	59	-RST
26	+MSG	60	-MSG
27	+SEL	61	-SEL
28	+C/D	62	-C/D
29	+REQ	63	-REQ
30	+I/O	64	-I/O
31	+DB(8)	65	-DB(8)
32	+DB(9)	66	-DB(9)
33	+DB(10)	67	-DB(10)
34	+DB(11)	68	-DB(11)

2-10 Installing Software Drivers

After all the hardware has been installed you must install the software drivers. The necessary drivers are all included on the Supermicro CD that came packaged with your motherboard. After inserting this CD into your CDROM drive, the display shown in Figure 2-5 should appear. (If this display does not appear, click on the My Computer icon and then on the icon representing your CDROM drive. Finally, double click on the S "Setup" icon.)

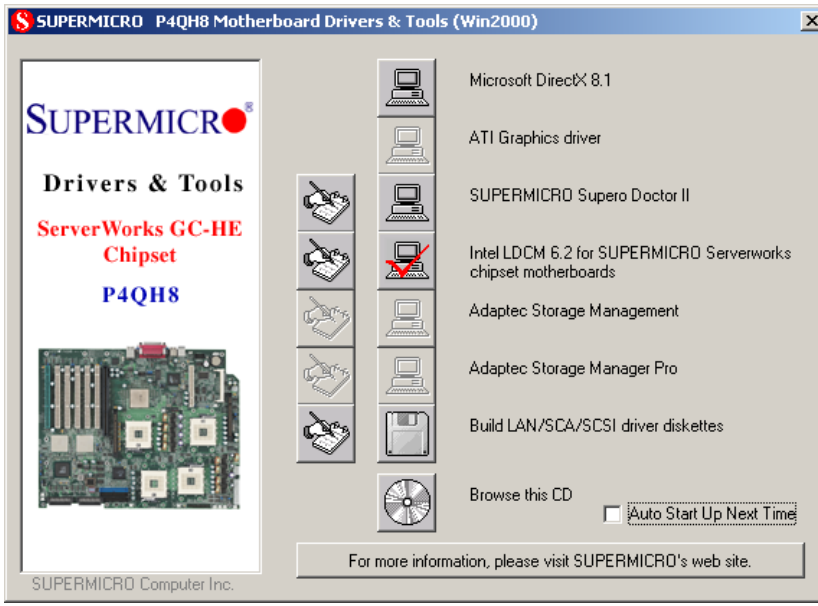


Figure 2-5. Driver/Tool Installation Display Screen

Click the icons showing a hand writing on paper to view the readme files for each item. The bottom icon with a CD on it allows you to view the entire contents of the CD.

Notes

Chapter 3
Troubleshooting

3-1 Troubleshooting Procedures

Use the following procedures to troubleshoot your system. If you have followed all of the procedures below and still need assistance, refer to the 'Technical Support Procedures' and/or 'Returning Merchandise for Service' section(s) in this chapter.

Note: Always disconnect the power cord before adding, changing or installing any hardware components.

Before Power On

1. Make sure no short circuits exist between the motherboard and chassis.
2. Disconnect all ribbon/wire cables from the motherboard, including those for the keyboard and mouse.
3. Remove all add-on cards.
4. Install one CPU (making sure it is fully seated) and connect the chassis speaker and the power LED to the motherboard. (Check all jumper settings as well.)

No Power

1. Make sure you have connected all three power connections: one 20-pin (ATX PWR CONN), one 4-pin (J47) and one 8-pin connector (J38).
1. Make sure no short circuits exist between the motherboard and the chassis.
2. Verify that all jumpers are set to their default positions.
3. Check that the 115V/230V switch on the power supply is properly set.
4. Turn the power switch on and off to test the system.
5. The battery on your motherboard may be old. Check to verify that it still supplies ~3VDC. If it does not, replace it with a new one.

No Video

1. If the power is on but you have no video, remove all the add-on cards and cables.

NOTE

If you are a system integrator, VAR or OEM, a POST diagnostics card is recommended. For I/O port 80h codes, refer to App. B.

Memory Errors

1. Make sure the DIMM modules are fully seated in their slots and installed four at a time in the order stated in Chapter 2, Section 3.
2. Determine if different speeds of DIMMs have been installed and verify that the BIOS setup is configured for the fastest speed of RAM used. It is recommended to use the same RAM speed for all DIMMs in the system.
3. Make sure you are using DDR-266/200, registered ECC SDRAM.
4. Check for bad DIMM modules or slots by swapping a single module between two slots and noting the results.
5. Make sure all memory modules are fully seated in their slots.
6. Check the power supply voltage 115V/230V switch.
7. Use the speaker to determine if any beep codes exist. Refer to Appendix A for details on beep codes.

Losing the System's Setup Configuration

1. Ensure that you are using a high quality power supply. A poor quality power supply may cause the system to lose the CMOS setup information. Refer to Section 1-6 for details on recommended power supplies.
2. The battery on your motherboard may be old. Check to verify that it still supplies ~3VDC. If it does not, replace it with a new one.
3. If the above steps do not fix the Setup Configuration problem, contact your vendor for repairs.

3-2 Technical Support Procedures

Before contacting Technical Support, please take the following steps. Also, note that as a motherboard manufacturer, Super Micro does not sell directly to end-users, so it is best to first check with your distributor or reseller for troubleshooting services. They should know of any possible problem(s) with the specific system configuration that was sold to you.

1. Please go through the 'Troubleshooting Procedures' and 'Frequently Asked Question' (FAQ) sections in this chapter or see the FAQs on our web site (http://www.supermicro.com/techsupport.htm) before contacting Technical Support.
2. BIOS upgrades can be downloaded from our web site at http://www.supermicro.com/techsupport/download.htm.

Note: Not all BIOS can be flashed depending on the modifications to the boot block code.

3. If you still cannot resolve the problem, include the following information when contacting Super Micro for technical support:
   - Motherboard model and PCB revision number
   - BIOS release date/version (this can be seen on the initial display when your system first boots up)
   - System configuration

   An example of a Technical Support form is on our web site at http://www.supermicro.com/techsupport/contact_support.htm.
4. Distributors: For immediate assistance, please have your account number ready when placing a call to our technical support department. We can be reached by e-mail at support@supermicro.com or by fax at: (408) 503-8000, option 2.

3-3 Frequently Asked Questions

Question: What are the various types of memory that the P4QH8/ P4QH6 motherboard can support?

Answer: The P4QH8/P4QH6 comes with an MEC card having 16 DIMM slots that support up to 32 GB of 168-pin, registered ECC DDR-266/200 only. Unbuffered SDRAM or non-ECC memory is not supported. PC133 and PC100 memory are not supported. **Important: The memory employs a four-way interleaved scheme, which requires you to install memory modules four at a time (see Section 2-3 for details.)**

Question: How do I update my BIOS?

Answer: It is recommended that you **do not** upgrade your BIOS if you are experiencing no problems with your system. Updated BIOS files are located on our web site at http://www.supermicro.com. Please check our BIOS warning message and the info on how to update your BIOS on our web

site. Also, check the current BIOS revision and make sure it is newer than your BIOS before downloading. Select your motherboard model and download the BIOS file to your computer. Unzip the BIOS update file and you will find the readme.txt (flash instructions), the flash.bat (BIOS flash utility) and the BIOS image (xxxxxx.rom) files. Copy these files onto a bootable floppy and reboot your system. It is not necessary to set BIOS boot block protection jumpers on the motherboard. At the DOS prompt, enter the command "flash." This will start the flash utility and give you an opportunity to save your current BIOS image. Flash the boot block and enter the name of the update BIOS image file.

Note: It is important to save your current BIOS and **rename it "super.rom"** in case you need to recover from a failed BIOS update. Select flash boot block, then enter the update BIOS image. Select "Y" to start the BIOS flash procedure and do not disturb your system until the flash utility displays that the procedure is complete. After updating your BIOS, please clear the CMOS then load Optimal Values in the BIOS.

Question: After flashing the BIOS my system does not have video. How can I correct this?

Answer: If the system does not have video after flashing your new BIOS, it indicates that the flashing procedure failed. To remedy this, first clear CMOS per the instructions in this manual and retry the BIOS flashing procedure. If you still do not have video, please use the following **BIOS Recovery Procedure**. First, turn your system off and place the floppy disk with the saved BIOS image file (see above FAQ) in drive A. Press and hold <CTRL> and <Home> at the same time, then turn on the power with these keys pressed until your floppy drive starts reading. Your screen will remain blank until the BIOS program is done. If the system reboots correctly, then the recovery was successful. The BIOS Recovery Procedure will not update the boot block in your BIOS.

Question: What's on the CD that came with my motherboard?

Answer: The supplied compact disc has quite a few drivers and programs that will greatly enhance your system. We recommend that you review the CD and install the applications you need. Applications on the CD include chipset drivers for Windows and security and audio drivers.

Question: Why can't I turn off the power using the momentary power on/off switch?

Answer: The instant power off function is controlled in BIOS by the Power Button Mode setting. When the On/Off feature is enabled, the motherboard will have instant off capabilities as long as the BIOS has control of the system. When the Standby or Suspend feature is enabled or when the BIOS is not in control such as during memory count (the first screen that appears when the system is turned on), the momentary on/off switch must be held for more than four seconds to shut down the system. This feature is required to implement the ACPI features on the motherboard.

3-4 Returning Merchandise for Service

A receipt or copy of your invoice marked with the date of purchase is required before any warranty service will be rendered. You can obtain service by calling your vendor for a Returned Merchandise Authorization (RMA) number. When returning to the manufacturer, the RMA number should be prominently displayed on the outside of the shipping carton, and mailed prepaid or hand-carried. Shipping and handling charges will be applied for all orders that must be mailed when service is complete.

This warranty only covers normal consumer use and does not cover damages incurred in shipping or from failure due to the alternation, misuse, abuse or improper maintenance of products.

During the warranty period, contact your distributor first for any product problems.

Notes

Chapter 4
AMIBIOS

4-1 Introduction

This chapter describes the AMIBIOS for the P4QH8/P4QH6. The AMI ROM BIOS is stored in a Flash EEPROM and can be easily upgraded using a floppy disk-based program.

Note: Due to periodic changes to BIOS, some settings may have been added or deleted and might not yet be recorded in this manual. Refer to the Manual Download area of our web site for any changes to BIOS that are not reflected in this manual.

System BIOS

The BIOS is the Basic Input Output System used in all IBM® PC, XT™, AT®, and PS/2® compatible computers. The BIOS ROM stores the system parameters, such as amount of memory, type of disk drives and video displays, etc. BIOS ROM requires very little power. When the computer is turned off, a back-up battery provides power to the BIOS ROM, enabling it to retain the system parameters. Each time the computer is powered-on, the computer is then configured with the values stored in the BIOS ROM by the system BIOS, which gains control when the computer is powered on.

How To Change the Configuration Data

The configuration data that determines the system parameters may be changed by entering the BIOS Setup utility. This Setup utility can be accessed by pressing <Del> at the appropriate time during system boot.

Starting the Setup Utility

Normally, the only visible POST (Power On Self Test) routine is the memory test. As the memory is being tested, press the <Delete> key to enter the main menu of the BIOS Setup utility. From the main menu, you can access the other setup screens, such as the Chipset and Power menus. Section 4-3 gives detailed descriptions of each parameter setting in the Setup utility.

An AMIBIOS identification string is displayed at the left bottom corner of the screen, below the copyright message.

4-2 BIOS Features

- Supports Plug and Play V1.0A and DMI 2.3
- Supports Intel PCI (Peripheral Component Interconnect) (PME) local bus specification 2.2
- Supports Advanced Power Management (APM) specification v 1.1
- Supports ACPI
- Supports Flash ROM

AMIBIOS supports the LS120 drive made by Matsushita-Kotobuki Electronics Industries Ltd. The LS120:

- Can be used as a boot device
- Is accessible as the next available floppy drive

AMIBIOS supports PC Health Monitoring chips. When a failure occurs in a monitored activity, AMIBIOS can sound an alarm and display a message. The PC Health Monitoring chips monitor:

- CPU temperature
- Chassis intrusion detector
- Five positive voltage inputs
- Four fan speed monitor inputs

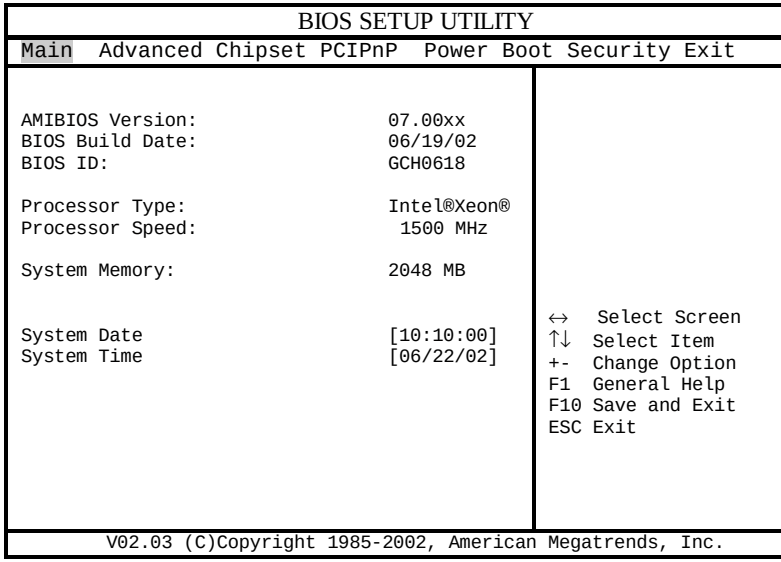
4-3 Running Setup

Optimal default settings are in bold text unless otherwise noted.

The BIOS setup options described in this section are selected by choosing the appropriate text from the Standard Setup screen. All displayed text is described in this section, although the screen display is often all you need to understand how to set the options (see on next page).

The Main BIOS Setup Menu

Press the <Delete> key during the POST (Power On Self Test) to enter the Main Menu of the BIOS Setup Utility. All Main Setup options are described in this section. The Main BIOS Setup screeen is displayed below.



Use the Up/Down arrow keys or the <Tab> key to move between the different settings in the above menu.

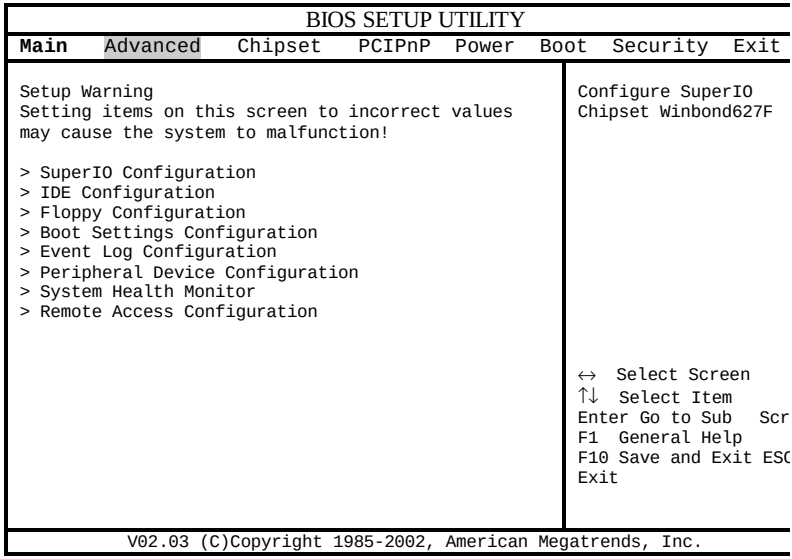
When the items "System Time", and "System Date" are highlighted, type in the correct time/date in the time field, and then press "Enter". The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format. The time is in also 24-hour format. For example, 5:30 a.m. appears as 05:30:00 and 5:30 p.m. as 17:30:00.

Press the <ESC> key to exit the Main Menu and use the Left/Right arrow keys to enter the the other categories of BIOS settings. The next section is described in detail to illustrate how to navigate through the menus.

Note: Items displayed in gray are preset and cannot be selected. Items with a blue arrow are commands, not options (i.e. Discard Changes).

4-4 Advanced BIOS Setup

Choose Advanced BIOS Setup from the AMIBIOS Setup Utility main menu with the Left/Right arrow keys. You should see the following display. Select one of the items in the left frame of the screen, such as SuperIO Configuration, to go to the sub screen for that item. Advanced BIOS Setup options are displayed by highlighting the option using the arrow keys. All Advanced BIOS Setup options are described in this section.

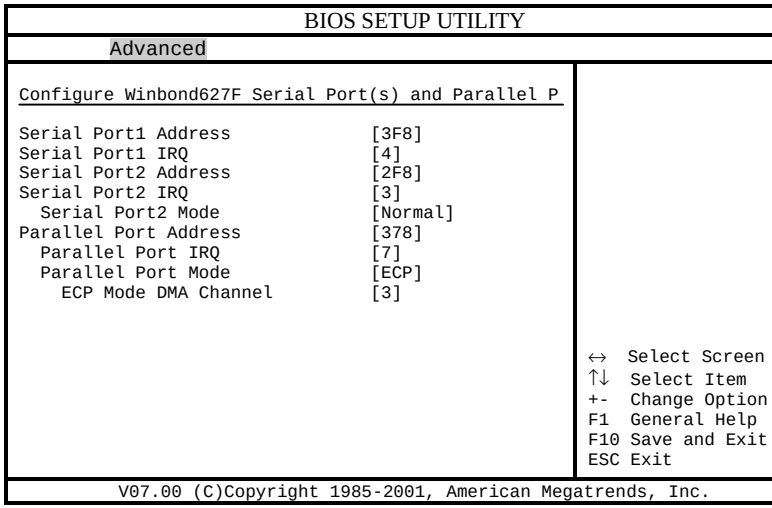


Use the Up/Down arrow keys to select the "Super I/O Configuration line.

When the "Super IO Configuration" line is highlighted, hit "ENTER" to display its menu.

The following Super IO Configuration screen will appear. Here you can select your options for the your computer's I/O (Input/Output) devices.

Super IO Configuration



The Super IO Configuration includes the following items:

Serial Port 1 Address

This option specifies the base I/O port address of serial port 1. The settings for this item include Disabled, **3F8** and 3E8 and 2E8. Select the desired setting and then press "Enter".

Serial Port 1 IRQ

This option specifies the Interrupt Request address of serial port 1. The settings for this item include Disabled, **4** and 3.

Serial Port 2 Address

This option specifies the base I/O port address of serial port 2. The settings for this item include Disabled, **2F8**, 3E8 and 2E8.

Serial Port 2 IRQ

This option specifies the Interrupt Request address of serial port 2. The settings for this item include Disabled, 4 and **3**.

Serial Port 2 Mode

Use this option to choose the Serial Port 2 Mode. The settings are **Normal**, Sharp-IR, SIR and consumer.

Parallel Port Address

This option specifies the I/O address used by the parallel port. The settings for this item include Disabled, **378**, 278 and 3BC. Select your setting and then press "Enter".

Parallel Port IRQ

This option allows the user to set the Parallel Port IRQ. The settings for this item include 5 and **7**.

Parallel Port Mode

This option specifies the parallel port mode. The settings for this item include Normal, Bi-directional, EPP and **ECP**.

ECP Mode DMA Channel

This option allows the user to set the setting for the ECP Mode of the DMA Channel. The settings for this item include **0**, 1 and 3.

IDE Configuration

Primary IDE Master

When entering "Setup", BIOS automatically detects the presence of IDE devices. This displays the auto detection status of the IDE devices. You can also manually configure the IDE drives by providing the following information:

This option allows the user to configure the IDE devices. When the desired item is highlighted (selected), press "Enter" and the following items will be displayed:

Type

This option sets the type of device that the AMIBIOS attempts to boot from after AMIBIOS POST is completed. The settings include Not installed, **Auto**, CDROM and ARMD. The "Auto" setting allows BIOS to automatically detect the presence of the IDE controller.

LBA/Large Mode

LBA (Logical Block Addressing) is a method of addressing data on a disk drive. In LBA mode, the maximum drive capacity is 137 GB. The settings are Disabled and **Auto**. Select "Disabled" to disable LBA mode. Select "Auto" to enable LBA mode if your device supports it and is not already formatted with the LBA mode.

Block (Multi-Sector Transfer) Mode

This option sets the block mode multi sector transfers option. The settings include Disabled and **Auto**. Disabled: This option prevents the BIOS from using Multi-Sector Transfer on the specified channel. The data to and from the device will occur one sector at a time. Auto: This option allows the BIOS to auto detect device support for Multi-Sector Transfers on the specified channel. If supported, this option allows the BIOS to auto detect the number of sectors per block for transfer from the hard disk drive to memory. The data transfer to and from the device will occur multiple sectors at a time (if the device supports it).

PIO Mode

IDE PIO (Programmable I/O) mode programs timing cycles between the IDE drive and the programmable IDE controller. As the PIO mode increases, the cycle time decreases. The settings are: **Auto**, 0, 1, 2, 3 and 4.

DMA Mode

This item allows the users to select the DMA mode. The settings are: **Auto**, SWDMA0, SWDMA1, SWDMA2, MWDMA0, MWDMA1, MWDM2, UWDMA0, UWDMA1, UWDMA2, UWDMA3 and UWDMA4. Select Auto to auto detect the DMA Mode. Select SWDMA0 through SWDMA2 to set single word DMA0 through DMA2. Select MWDMA0 through MWDMA2 to set Multi-word DMA0 through DMA2. Select UDMA0 trhough UDMA4 to set Ultra DMA0 through Ultra DMA4.

S.M.A.R.T.

S.M.A.R.T stands for Self-Monitoring Analysis and Reporting Technology, a feature that can help predict impending drive failures. The settings are **Auto**, Disabled and Enabled. Select "Enabled" or "Disabled" to enable or disable the S.M.A.R.T. Select "Auto" to auto detect S.M.A.R.T.

32Bit Data Transfer

The settings are Auto, Disabled and **Enabled**. Select "Enabled" or "Disabled" to enable or disable the 32-bit Data Transfer function. Select "Auto" to auto detect the 32-bit Data Transfer function.

ARMD Emulation Type

This option is used to select the ARMD emulation type used when configuring an LS120, MO (Magneto-Optical), or Iomega Zip drive. The settings are **Auto**, Floppy and HardDisk. (ARMD stands for ATA(PI) Removable Media Disk).

Primary IDE Slave

When the system enters "Setup", BIOS automatically detects the presence of IDE devices. This option displays the auto detection status of IDE devices. The settings for "Primary IDE Slave" are the same as those for the "Primary IDE Master".

Secondary IDE Master

This displays the status of auto detection of IDE devices. The settings for "Secondary IDE Master" are the same as those for the "Primary IDE Master".

Secondary IDE Slave

This displays the status of auto detection of IDE devices. The settings for "Secondary IDE Slave" are the same as those for the "Primary IDE Master".

Hard Disk Write Protect

This item allows the user to prevent the hard disk from being overwritten. The options are Enabled or **Disabled**. Enabled allows the drive to be used normally; read, write and erase functions can all be performed. Disabled prevents the hard disk from being erased. This function is effective only

when the device is accessed through BIOS.

ATA(PI) Detect Timeout (Seconds)

Set this option to stop the system search for ATAPI devices within the specified number of seconds. The options are 0, 5, 10, 15, 20, 25, 30 and **35** (seconds). Most ATA disk drives can be detected within 5 seconds.

ATA(PI) 80pin Cable Detection

This option allows you to select the mechanism used to detect the 80-pin ATA(PI) cable. The settings are Host, Device and **Host & Device**.

Floppy Configuration

Floppy A

Use this option to specify which of floppy drive you have installed in the A drive. The settings are Disabled, 360 KB 5 1/4", 1.2 MB 5 1/4", 720 KB 3 1/2", **1.44 MB 3 1/2"** and 2.88 MB 3 1/2".

Floppy B

Use this option to specify which of floppy drive you have installed in the B drive. The settings are Disabled, 360 KB 5 1/4", 1.2 MB 5 1/4", 720 KB 3 1/2", **1.44 MB 3 1/2"** and 2.88 MB 3 1/2".

Diskette Write Protect

This option allows you to prevent any writing to your floppy diskette. The settings are **Disabled,** 360 KB 5 1/4", 1.2 MB 5 1/4", 720 KB 3 1/2", **1.44 MB 3 1/2"** and 2.88 MB 3 1/2". The Enabled setting is effective only if the device is accessed through BIOS.

Floppy Drive Seek

Use this option to Enable or **Disable** the floppy seek routine on bootup.

Boot Settings Configuration

Quick Boot

This option allows the BIOS to skip certain tests that are normally perfomred on boot up. You can disable the option to speed up boot time. The settings are **Disabled** and Enabled.

Quiet Boot

If Disabled, this option will cause the normal POST messages to be displayed upon setup. When Enabled, the OEM logo is displayed instead of the POST messages. The settings are Enabled, and **Disabled**.

Add-On ROM Display Mode

Set this option to display add-on ROM (read-only memory) messages. The settings for this option are **Force BIOS** and Keep Current. Force BIOS

allows the computer to force a third party BIOS to display during system boot. Keep Current has the system display AMIBIOS information on bootup.

BootUp Num Lock

This option is used to select the status of the Number Lock function on your keyboard on bootup. The settings are **On** and Off.

BootUp CPU Speed

This option is used set the CPU speed to either **High** or Low.

PS/2 Mouse Support

This option specifies whether a PS/2 Mouse will be supported. Settings are **Enabled** and Disabled.

Typematic Rate

Set this option to select the rate at which the computer repeats a key that is held down. Settings are **Fast** and Slow. Fast: This sets the rate the computer repeats a key to over 20 times per second. Under normal operations, this setting should not be changed. Slow: This sets the rate the computer repeats a key to under 8 times per second.

System Keyboard

This option is to let the system know if a keyboard is **Present** or Absent.

Primary Display

This option specifies the type of monitor display you have installed on the system. The settings are Absent, **VGA/EGA**, Color 40 x 25, Color 80 x 25 and monochrome.

Parity Check

Use this option to either Enable or **Disable** the use of memory parity checking.

Boot to OS/2

This option can be used to boot the system to an OS/2 operating system. The settings are **No** and Yes.

Wait for F1 if Error

This settings for this option are **Enabled** and Disabled. Disabled: This prevents the AMIBIOS to wait on an error for user intervention. This setting should be used if there is a known reason for a BIOS error to appear. An example would be a system administrator must remote boot the system. The computer system does not have a keyboard currently attached. If this setting is set, the system will continue to bootup in to the operating system. If 'F1' is enabled, the system will wait until the BIOS setup is entered. Enabled: This option allows the system BIOS to wait for any error. If an error is detected, pressing <F1> will enter Setup and the BIOS setting can be adjusted to fix the problem. This normally happens when upgrading the hardware and not setting the BIOS to recognize it.

Hit "Delete" Message Display

This option tells the system to display or not display the "Hit Delete to Enter Setup" message. The settings are **Enabled** and Disabled.

Cache

This option is for enabling or disabling the internal CPU L1 cache. Settings include Disabled, Write-Thru, **Write-Back** and Reserved. Disabled: This option prevents the system from using the internal CPU L1 cache. This

setting should be used to slow the computer system down or to trouble-shoot error messages. Write-Thru: This option allows the computer system to use the internal CPU L1 cache as Write-Though cache. Write-Through cache is slower than Write-Back cache. It performs write operations to the internal L1 CPU cache and system memory simultaneously. Write-Back: This option allows the computer system to use the internal CPU L1 cache as Write-Back cache. Write-Back cache is faster than Write-Through cache. Write-Back cache is a caching method in which modifications to data in the cache aren't copied to the cache source until absolutely necessary. Write-back caching is available on all CPUs supported by this BIOS. With these CPUs, write operations stored in the L1 cache aren't copied to main memory until absolutely necessary. This is the default setting.

System BIOS Cacheable

This option enables you to move the system BIOS to the memory cache to improve performance. Settings are **Enabled** and Disabled.

Event Log Configuration

Event Logging

This option **Enables** or Disables the logging of events. You can use this screen to select options for the Event Log Configuration Settings. You can access sub screens to view the event log and mark all events as read. Use the up and down arrow keys to select an item, and the plus (+) and minus (-) keys to change the option setting. The settings are described on the following pages. The screen is shown below.

View Event Log

Highlighting this and pressing <Enter> will allow you to view the unread events from the event log area.

Mark All Events As Read

Highlighting [OK] and pressing <Enter> will mark all events in the log area as having been read. The settings are OK and **Cancel**.

Peripheral Device Configuration

Power Lost Control

This option determines how the system will respond when power is reapplied after a power loss condition. Choose **Always On** to automatically start up the system when power is reapplied. Always Off means you must push the main power button to restart the system after power is restored.

PME Wakeup

This option allows you to **Enable** or Disable PME Wakeup.

System Health Monitor

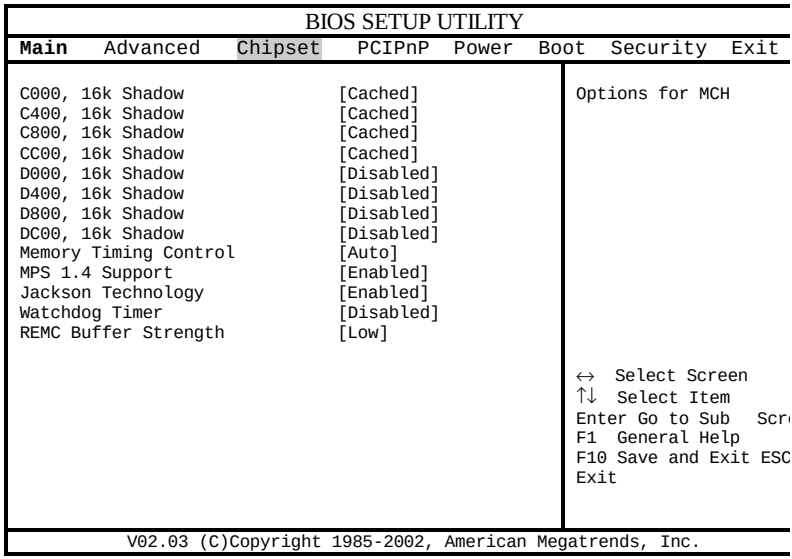
The BIOS continuously monitors the health of your system by measuring certain voltage levels and temperatures. Clicking this option and hitting <Enter> will display a list of monitored temperatures and voltages on the system.

Remote Access Configuration

This option allows the user to redirect the console (display) through the COM port when enabled. This is useful when two computers are hooked up to a single monitor. When enabled, the user can toggle the display from one system to the other using the <Tab> key. The function keys are disabled when this setting is enabled. The settings are "Serial ANSI" and "**Disabled**."

4-5 Chipset Setup

Choose Chipset Setup from the AMIBIOS Setup Utility main menu. The screen is shown below. All Chipset Setup options are described following the screen.



C000, 16k Shadow

C400, 16k Shadow

C800, 16k Shadow

CC00, 16k Shadow

D000, 16k Shadow

D400, 16k Shadow

D800, 16k Shadow

DC00, 16k Shadow

These options specify how the 16 KB of video ROM at each of the above addresses is treated. When Disabled, the contents of the video ROM are not copied to RAM. When Enabled, the contents of 16 KB of video ROM beginning at the above address are copied (shadowed) from ROM to RAM

for faster application. The settings for this option are Disabled and Enabled. (The optimal settings are **Cached** for C000, C400, C800 anc CC00 and **Disabled** for all the other addresses.

Memory Timing Control

Determines how the memory timing is controlled. **Auto** lets BIOS program the memory timing from SPD data. Manual allows the user to select the appropriate memory timing.

MPS 1.4 Support

The settings for this option are **Enabled** and Disabled.

Jackson Technology

Enables Jackson Technology if supported by the operating system. Jackson Technology is a method of creating an additional "virtual" processor by means of "hyper-threading", which uses parallelism to process mulitple instructions simultaneously. The settings for this option are **Enabled** and Disabled.

Watchdog Timer

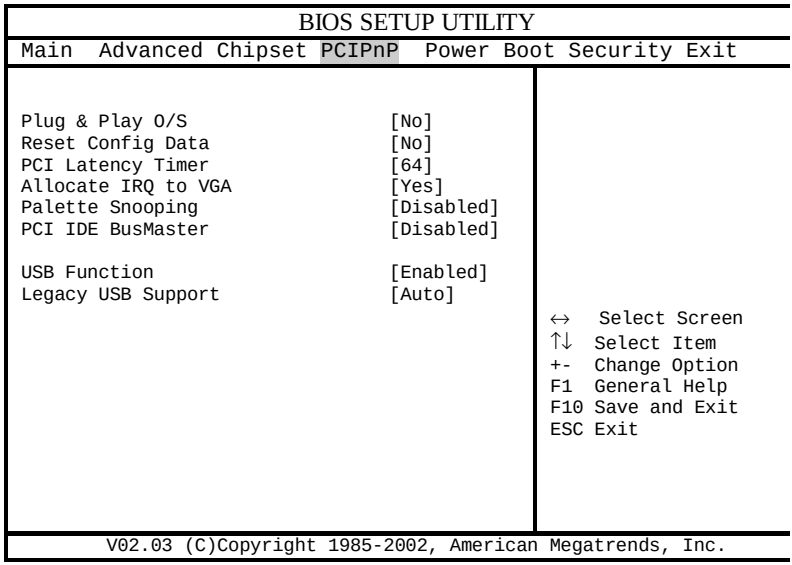
This option is used to configure the Watchdog timer. Settings are **Disabled**, 2 minutes, 5 minutes, 10 minutes and 15 minutes.

REMC Buffer Strength

This option is used to set the REMC buffer strength to either High or **Low**.

4-6 PCI PnP Setup

Choose PCI/PnP Setup from the AMIBIOS Setup main menu. All PCI/PnP options are described in this section. The PCI/PnP Setup screen is shown below.



Plug & Play OS

This option specifies how Plug and Play devices will be configured. The settins are Yes and **No**. No lets BIOS configure all devices in the system. Yes lets the operating system (if supported) configure PnP devices not required for bootup.

Reset Configuration Data

Choosing the Yes setting will cause the PnP configuration data in the BIOS to be cleared on the next boot up. Choosing the **No** setting does not force PnP data to be cleared on the next boot.

PCI Latency Timer

This option specifies the latency timing of the PCI clocks for all PCI devices. Settings include 32, **64**, 96, 128, 160, 192, 224 and 248 PCI clocks.

Allocate IRQ to PCI VGA

This option lets you allocate an interrupt request (IRQ) to the PCI VGA adapter card (if used). The settings are **Yes** and No.

Palette Snooping

When enabled, this option informs PCI devices that an ISA graphics device is installed. The settings are **Disabled** and Enabled. This does not necessarily indicate a physical ISA adapter card. The graphics chipset can be mounted on a PCI card. Always check with your adapter card manuals first, before modifying the default settings in the BIOS.

PCI IDE BusMaster

The settings for this option are **Disabled** and Enabled. Enable to specify that the IDE controller on the PCI bus has bus mastering capabilities.

USB Function

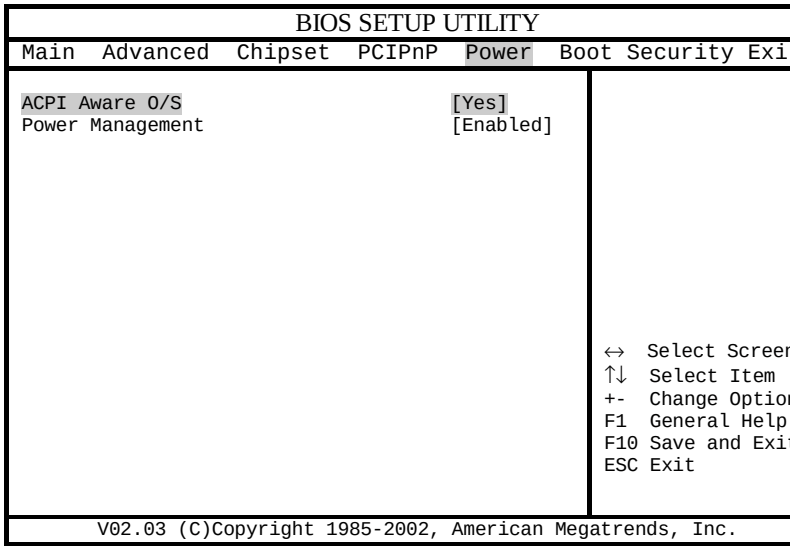
The settings for this option are Disabled and **Enabled**. Disabled prevents the use of the USB ports and Enabled allows the use of the USB ports.

Legacy USB Support

This option allows you to enable support for Legacy USB. The settings are **Auto**, Enabled and Disabled.

4-7 Power Setup

Choose Power Setup from the AMIBIOS Setup main menu. All Power Setup options are described in this section. The Power Setup screen is shown below.



ACPI Aware O/S

This option allows the system to utilize Intel's ACPI (Advanced Configuration and Power Interface) specification. Settings are No and **Yes**. DOS®, Windows 3.x®, and Windows NT® are examples of non-ACPI aware operating systems. Windows 95®, Windows 98®, Windows ME® and Windows 2000® are examples of ACPI aware operating systems.

Power Management

When enabled, this option displays the following four options relating to power management. The settings are **Disabled** and Enabled.

Power Button Mode

This option allows you to change the function of the chassis power button. The settings are **On/Off** and Suspend. When set to Suspend, depressing the power button when the system is up will cause it to enter a suspend state.

Sleep Button Enable

This option allows you to enable the use of a sleep button that can be connected to the motherboard. The settings are **Disabled** and Suspend.

Video Power Down

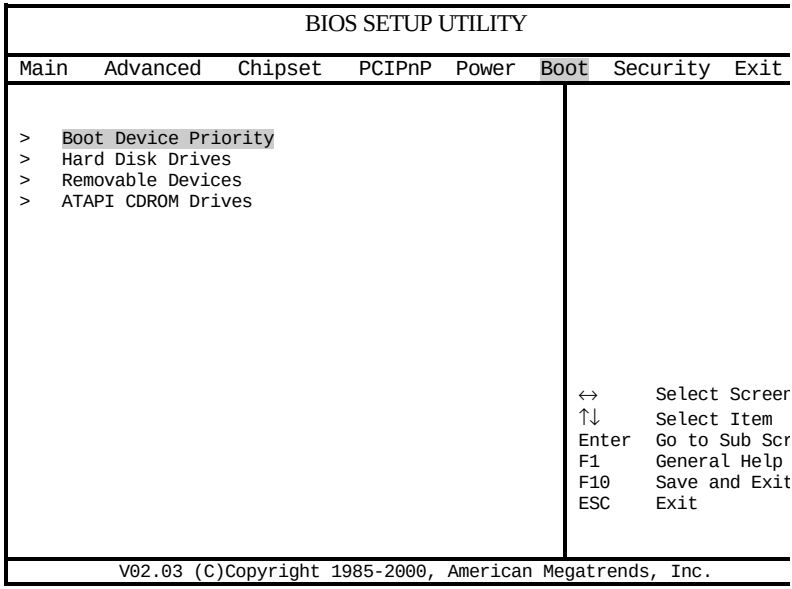
This option specifies the power state that the VGA video subsystem enters after the specified period of display inactivity has expired. The settings include Disabled, Standby, **Suspend** and Sleep.

Suspend Timeout (Minutes)

This option specifies the length of hard disk inactivity time that should expire before entering the power conserving state. The settings are **Off**, 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 (minutes).

4-8 Boot Setup

Choose Boot Setup from the AMIBIOS Setup main menu. All Boot Setup options are described in this section. The Boot Setup screen is shown below.


BIOS SETUP UTILITY
Main Advanced Chipset PCIPnP Power Boot Security Exit
> Boot Device Priority
> Hard Disk Drives
> Removable Devices
> ATAPI CDROM Drives
↔ Select Screer
↑↓ Select Item
Enter Go to Sub Scr
F1 General Help
F10 Save and Exit
ESC Exit
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Boot Device Priority

1st Boot Device

This option is used to specify the order of the boot sequence that will be followed from the available system devices. The settings for the 1st Boot Device are **Removable Device**, ATAPI CDROM, Hard Drive and Intel UNDI, PXE-2.0.

2nd Boot Device

The settings for the 2nd Boot Device are Removable Device, **ATAPI CDROM**, Hard Drive and Intel UNDI, PXE-2.0.

3rd Boot Device

The settings for the 3rd Boot Device are Removable Device, ATAPI CDROM, **Hard Drive** and Intel UNDI, PXE-2.0.

4th Boot Device

The settings for the 4th Boot Device are Removable Device, ATAPI CDROM, Hard Drive and **Intel UNDI, PXE-2.0**.

Hard Disk Drives

Use this screen to view the hard drives that have been auto-detected or entered manually on your system.

Removable Devices

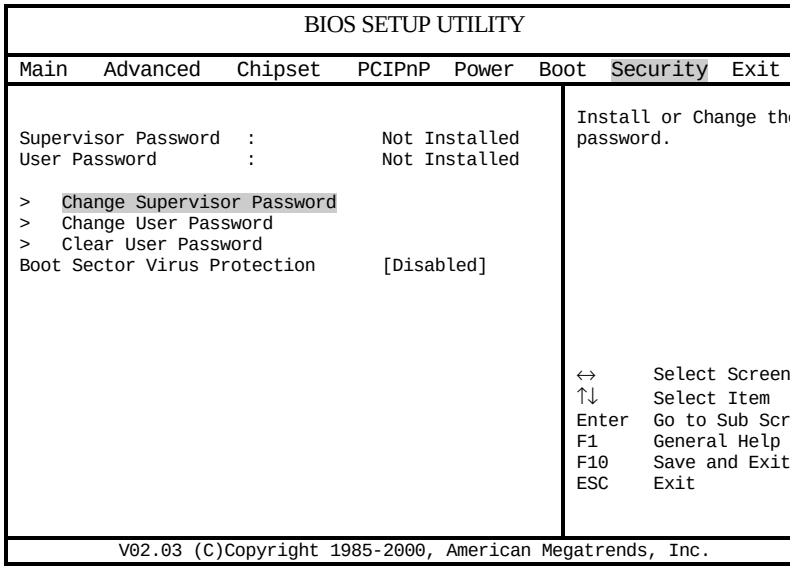
Use this screen to view the removeable devices that have been auto-detected or entered manually on your system.

ATAPI CDROM Drives

Use this screen to view the ATAPI CDROM drives that have been auto-detected or entered manually on your system.

4-9 Security Setup

Choose Security Setup from the AMIBIOS Setup main menu. All Security Setup options are described in this section. The Security Setup screen is shown below.


BIOS SETUP UTILITY
Main Advanced Chipset PCIPnP Power Boot Security Exit
Supervisor Password : Not Installed
User Password : Not Installed
> Change Supervisor Password
> Change User Password
> Clear User Password
Boot Sector Virus Protection [Disabled]
Install or Change th
password.
↔ Select Screen
↑↓ Select Item
Enter Go to Sub Scr
F1 General Help
F10 Save and Exit
ESC Exit
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Supervisor Password

User Password

AMIBIOS provides both Supervisor and User password functions. If you use both passwords, the Supervisor password must be set first. The system can be configured so that all users must enter a password every time the system boots or when AMIBIOS Setup is executed, using either or both the Supervisor password or User password. The Supervisor and User passwords activate two different levels of password security. If you select password support, you are prompted for a 1 – 6 character password. Type the password on the keyboard. The password does not appear on the screen when typed. Make sure you write it down. If you forget it, you must clear CMOS and reconfigure. **Remember your Password!** Keep a record of the new password when the password is changed. If you forget the password, you must erase the system configuration information in CMOS.

Change Supervisor Password

This option allows you to change a supervisor password that was entered previously.

Change User Password

This option allows you to change a user password that was entered previously.

Clear User Password

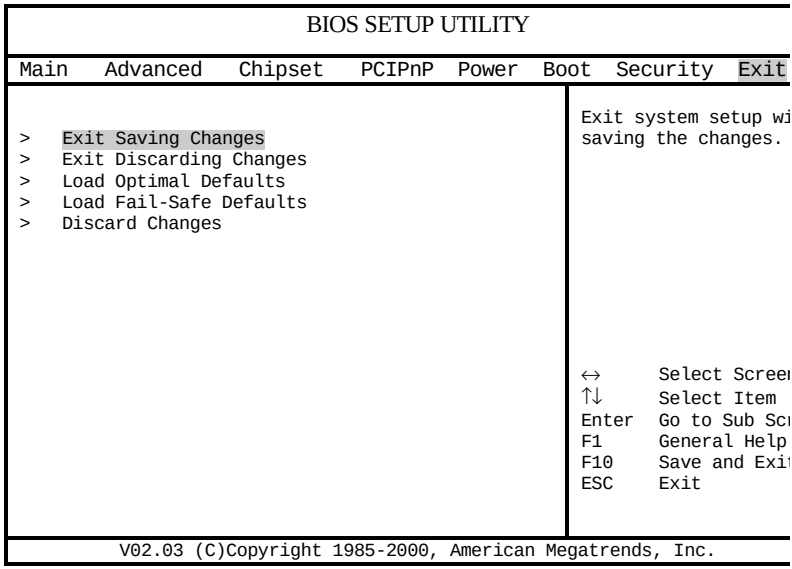
Use this option to clear the user password so that it is not required to be entered when the system boots up.

Boot Sector Virus Protection

This option allows you to enable or disable a virus detection program to protect the boot sector of your hard disk drive. The settings for this option **Disabled** and Enabled. If Enabled, AMIBIOS will display a warning when any program (or virus) issues a Disk Format command or attempts to write to the boot sector of the hard disk drive.

4-10 Exit Setup

Choose Exit Setup from the AMIBIOS Setup main menu. All Exit Setup options are described in this section. The Exit Setup screen is shown below.



Exit Saving Changes

Highlighting this setting and then pressing <Enter> will save any changes you made in the BIOS Setup program and then exit. Your system should then continue with the boot up procedure.

Exit Discarding Changes

Highlighting this setting and then pressing <Enter> will ignore any changes you made in the BIOS Setup program and then exit. Your system should then continue with the boot up procedure.

Load Optimal Defaults

Highlighting this setting and then pressing <Enter> provides the optimum performance settings for all devices and system features.

Load Failsafe Defaults

Highlighting this setting and then pressing <Enter> provides the safest set of parameters for the system. Use them if the system is behaving erratically.

Discard Changes

Highlighting this setting and then pressing <Enter> will ignore any changes you made in the BIOS Setup program but will not exit the BIOS Setup program.

Notes

Appendix A
BIOS Error Beep Codes

During the POST (Power-On Self-Test) routines, which are performed each time the system is powered on, errors may occur.

Non-fatal errors are those which, in most cases, allow the system to continue the boot-up process. The error messages normally appear on the screen.

Fatal errors are those which will not allow the system to continue the boot-up procedure. If a fatal error occurs, you should consult with your system manufacturer for possible repairs.

These fatal errors are usually communicated through a series of audible beeps. The numbers on the fatal error list, on the following page, correspond to the number of beeps for the corresponding error. All errors listed, with the exception of Beep Code 8, are fatal errors.

POST codes may be read on the debug LEDs located beside the LAN port on the motherboard backplane. See the description of the Debug LEDs (D13-D20) in Section 2-8.

A-1 AMIBIOS Error Beep Codes

Beep Code	Error Message	Description
1 beep	Refresh	Circuits have been reset. (Ready to power up.)
6 beeps	Memory error	No memory detected in system
8 beeps	Display memory read/write error	Video adapter missing or with faulty memory

Notes

Appendix B
BIOS POST Checkpoint Codes

When AMIBIOS performs the Power On Self Test, it writes diagnostic codes checkpoint codes to I/O port 0080h. If the computer cannot complete the boot process, diagnostic equipment can be attached to the computer to read I/O port 0080h.

B-1 Uncompressed Initialization Codes

The uncompressed initialization checkpoint codes are listed in order of execution:

Checkpoint	Code Description
D0h	The NMI is disabled. Power on delay is starting. Next, the initialization code checksum will be verified.
D1h	Initializing the DMA controller, performing the keyboard controller BAT test, starting memory refresh, and entering 4 GB flat mode next.
D3h	Starting memory sizing next.
D4h	Returning to real mode. Executing any OEM patches and setting the Stack next.
D5h	Passing control to the uncompressed code in shadow RAM at E000:0000h. The initialization code is copied to segment 0 and control will be transferred to segment 0.
D6h	Control is in segment 0. Next, checking if <Ctrl> <Home> was pressed and verifying the system BIOS checksum. If either <Ctrl> <Home> was pressed or the system BIOS checksum is bad, next will go to checkpoint code E0h. Otherwise, going to checkpoint code D7h.

B-2 Bootblock Recovery Codes

The bootblock recovery checkpoint codes are listed in order of execution:

Checkpoint	Code Description
E0h	The onboard floppy controller if available is initialized. Next, beginning the base 512 KB memory test.
E1h	Initializing the interrupt vector table next.
E2h	Initializing the DMA and Interrupt controllers next.
E6h	Enabling the floppy drive controller and Timer IRQs. Enabling internal cache memory.
Edh	Initializing the floppy drive.
Eeh	Looking for a floppy diskette in drive A:. Reading the first sector of the diskette.
Efh	A read error occurred while reading the floppy drive in drive A:.
F0h	Next, searching for the AMIBOOT.ROM file in the root directory.
F1h	The AMIBOOT.ROM file is not in the root directory.
F2h	Next, reading and analyzing the floppy diskette FAT to find the clusters occupied by the AMIBOOT.ROM file.
F3h	Next, reading the AMIBOOT.ROM file, cluster by cluster.
F4h	The AMIBOOT.ROM file is not the correct size.
F5h	Next, disabling internal cache memory.
FBh	Next, detecting the type of flash ROM.
FCh	Next, erasing the flash ROM.
FDh	Next, programming the flash ROM.
FFh	Flash ROM programming was successful. Next, restarting the system BIOS.

B-3 Uncompressed Initialization Codes

The following runtime checkpoint codes are listed in order of execution.
These codes are uncompressed in F0000h shadow RAM.

Checkpoint	Code Description
03h	The NMI is disabled. Next, checking for a soft reset or a power on condition.
05h	The BIOS stack has been built. Next, disabling cache memory.
06h	Uncompressing the POST code next.
07h	Next, initializing the CPU and the CPU data area.
08h	The CMOS checksum calculation is done next.
0Ah	The CMOS checksum calculation is done. Initializing the CMOS status register for date and time next.

0Bh The CMOS status register is initialized. Next, performing any required initialization before the keyboard BAT command is issued.

0Ch The keyboard controller input buffer is free. Next, issuing the BAT command to the keyboard controller.

0Eh The keyboard controller BAT command result has been verified. Next, performing any necessary initialization after the keyboard controller BAT command test.

0Fh The initialization after the keyboard controller BAT command test is done. The keyboard command byte is written next.

10h The keyboard controller command byte is written. Next, issuing the Pin 23 and 24 blocking and unblocking command.

11h Next, checking if <End or <Ins> keys were pressed during power on. Initializing CMOS RAM if the *Initialize CMOS RAM in every boot* AMIBIOS POST option was set in AMIBCP or the <End> key was pressed.

12h Next, disabling DMA controllers 1 and 2 and interrupt controllers 1 and 2.

13h The video display has been disabled. Port B has been initialized. Next, initializing the chipset.

14h The 8254 timer test will begin next.

19h The 8254 timer test is over. Starting the memory refresh test next.

1Ah The memory refresh line is toggling. Checking the 15 second on/off time next.

2Bh Passing control to the video ROM to perform any required configuration before the video ROM test.

2Ch All necessary processing before passing control to the video ROM is done. Looking for the video ROM next and passing control to it.

2Dh The video ROM has returned control to BIOS POST. Performing any required processing after the video ROM had control.

23h Reading the 8042 input port and disabling the MEGAKEY Green PC feature next. Making the BIOS code segment writable and performing any necessary configuration before initializing the interrupt vectors.

24h The configuration required before interrupt vector initialization has completed. Interrupt vector initialization is about to begin.

Checkpoint	Code Description
25h	Interrupt vector initialization is done. Clearing the password if the POST DIAG switch is on.
27h	Any initialization before setting video mode will be done next.
28h	Initialization before setting the video mode is complete. Configuring the monochrome mode and color mode settings next.
2Ah	Bus initialization system, static, output devices will be done next, if present. See the last page for additional information.
2Eh	Completed post-video ROM test processing. If the EGA/VGA controller is not found, performing the display memory read/write test next.
2Fh	The EGA/VGA controller was not found. The display memory read/write test is about to begin.
30h	The display memory read/write test passed. Look for retrace checking next.
31h	The display memory read/write test or retrace checking failed. Performing the alternate display memory read/write test next.
32h	The alternate display memory read/write test passed. Looking for alternate display retrace checking next.
34h	Video display checking is over. Setting the display mode next.
37h	The display mode is set. Displaying the power on message next.
38h	Initializing the bus input, IPL, general devices next, if present. See the last page of this chapter for additional information.
39h	Displaying bus initialization error messages. See the last page of this chapter for additional information.
3Ah	The new cursor position has been read and saved. Displaying the *Hit <DEL>* message next.
3Bh	The *Hit <DEL>* message is displayed. The protected mode memory test is about to start.
40h	Preparing the descriptor tables next.
42h	The descriptor tables are prepared. Entering protected mode for the memory test next.
43h	Entered protected mode. Enabling interrupts for diagnostics mode next.
44h	Interrupts enabled if the diagnostics switch is on. Initializing data to check memory wraparound at 0:0 next.
45h	Data initialized. Checking for memory wraparound at 0:0 and finding the total system memory size next.
46h	The memory wraparound test is done. Memory size calculation has been done. Writing patterns to test memory next.
47h	The memory pattern has been written to extended memory. Writing patterns to the base 640 KB memory next.

Checkpoint	Code Description
48h	Patterns written in base memory. Determining the amount of memory below 1 MB next.
49h	The amount of memory below 1 MB has been found and verified. Determining the amount of memory above 1 MB memory next.
4Bh	The amount of memory above 1 MB has been found and verified. Checking for a soft reset and clearing the memory below 1 MB for the soft reset next. If this is a power on situation, going to checkpoint 4Eh next.
4Ch	The memory below 1 MB has been cleared via a soft reset. Clearing the memory above 1 MB next.
4Dh	The memory above 1 MB has been cleared via a soft reset. Saving the memory size next. Going to checkpoint 52h next.
4Eh	The memory test started, but not as the result of a soft reset. Displaying the first 64 KB memory size next.
4Fh	The memory size display has started. The display is updated during the memory test. Performing the sequential and random memory test next.
50h	The memory below 1 MB has been tested and initialized. Adjusting the displayed memory size for relocation and shadowing next.
51h	The memory size display was adjusted for relocation and shadow ing. Testing the memory above 1 MB next.
52h	The memory above 1 MB has been tested and initialized. Saving the memory size information next.
53h	The memory size information and the CPU registers are saved. Entering real mode next.
54h	Shutdown was successful. The CPU is in real mode. Disabling the Gate A20 line, parity, and the NMI next.
57h	The A20 address line, parity, and the NMI are disabled. Adjusting the memory size depending on relocation and shadowing next.
58h	The memory size was adjusted for relocation and shadowing. Clearing the *Hit <DEL>* message next.
59h	The *Hit <DEL>* message is cleared. The *<WAIT...>* message is displayed. Starting the DMA and interrupt controller test next.

Checkpoint	Code Description
60h	The DMA page register test passed. Performing the DMA Controller 1 base register test next.
62h	The DMA controller 1 base register test passed. Performing the DMA controller 2 base register test next.
65h	The DMA controller 2 base register test passed. Programming DMA controllers 1 and 2 next.
66h	Completed programming DMA controllers 1 and 2. Initializing the 8259 interrupt controller next.
67h	Completed 8259 interrupt controller initialization.
7Fh	Extended NMI source enabling is in progress.
80h	The keyboard test has started. Clearing the output buffer and checking for stuck keys. Issuing the keyboard reset command next.
81h	A keyboard reset error or stuck key was found. Issuing the keyboard controller interface test command next.
82h	The keyboard controller interface test completed. Writing the com mand byte and initializing the circular buffer next.
83h	The command byte was written and global data initialization has completed. Checking for a locked key next.
84h	Locked key checking is over. Checking for a memory size mismatch with CMOS RAM data next.
85h	The memory size check is done. Displaying a soft error and checking for a password or bypassing WINBIOS Setup next.
86h	The password was checked. Performing any required programming before WINBIOS Setup next.
87h	The programming before WINBIOS Setup has completed. Uncompressing the WINBIOS Setup code and executing the AMIBIOS Setup or WINBIOS Setup utility next.
88h	Returned from WINBIOS Setup and cleared the screen. Performing any necessary programming after WINBIOS Setup next.
89h	The programming after WINBIOS Setup has completed. Displaying the power on screen message next.
8Bh	The first screen message has been displayed. The *<WAIT...>* message is displayed. Performing the PS/2 mouse check and extended BIOS data area allocation check next.
8Ch	Programming the WINBIOS Setup options next.
8Dh	The WINBIOS Setup options are programmed. Resetting the hard disk controller next.
8Fh	The hard disk controller has been reset. Configuring the floppy drive controller next.
91h	The floppy drive controller has been configured. Configuring the hard disk drive controller next.

Checkpoint	Code Description
95h	Initializing the bus option ROMs from C800 next. See the last page of this chapter for additional information.
96h	Initializing before passing control to the adaptor ROM at C800.
97h	Initialization before the C800 adaptor ROM gains control has com pleted. The adaptor ROM check is next.
98h	The adaptor ROM had control and has now returned control to BIOS POST. Performing any required processing after the option ROM returned control.
99h	Any initialization required after the option ROM test has completed. Configuring the timer data area and printer base address next.
9Ah	Set the timer and printer base addresses. Setting the RS-232 base address next.
9Bh	Returned after setting the RS-232 base address. Performing any required initialization before the Coprocessor test next.
9Ch	Required initialization before the Coprocessor test is over. Initializing the Coprocessor next.
9Dh	Coprocessor initialized. Performing any required initialization after the Coprocessor test next.
9Eh	Initialization after the Coprocessor test is complete. Checking the extended keyboard, keyboard ID, and Num Lock key next. Issuing the keyboard ID command next.
A2h	Displaying any soft errors next.
A3h	The soft error display has completed. Setting the keyboard typematic rate next.
A4h	The keyboard typematic rate is set. Programming the memory wait states next.
A5h	Memory wait state programming is over. Clearing the screen and enabling parity and the NMI next.
A7h	NMI and parity enabled. Performing any initialization required before passing control to the adaptor ROM at E000 next.
A8h	Initialization before passing control to the adaptor ROM at E000h completed. Passing control to the adaptor ROM at E000h next.
A9h	Returned from adaptor ROM at E000h control. Performing any initialization required after the E000 option ROM had control next.
Aah	Initialization after E000 option ROM control has completed. Displaying the system configuration next.
Abh	Uncompressing the DMI data and executing DMI POST initialization next.
B0h	The system configuration is displayed.
B1h	Copying any code to specific areas.
00h	Code copying to specific areas is done. Passing control to INT 19h boot loader next.

Notes